OCTOBER 21, 1961

Chemical Week

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Urethane foam boost: new developments free makers from royalty worries . p. 21

Jolt for drugmakers: top distributor moves deeper into manufacturing . p. 37

Hydrogen-hungry CPI sizes up new naphtha-reforming processes . . . . . p. 61

Industry integrates— how CPI is complying with government's anti-bias code . . p. 77

STARCH STARS IN SOLUBLE-FILM DEBUT . . . . . p. 51

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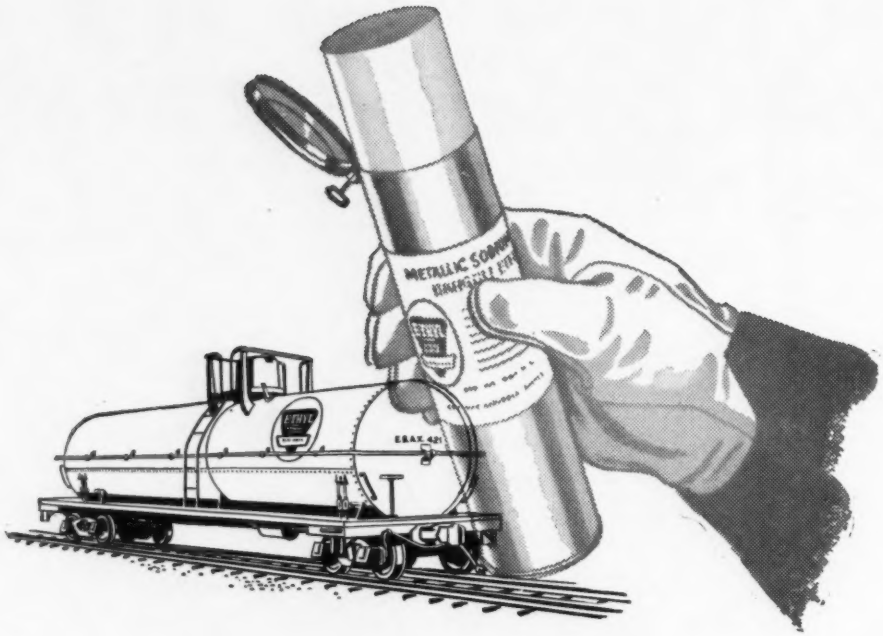

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ON THE COVER: In the hands of Morningstar-Paisley's Thomas Morningstar is a sample of soon-to-be-marketed potato starch film. The novel packaging film is water soluble (see p. 51).

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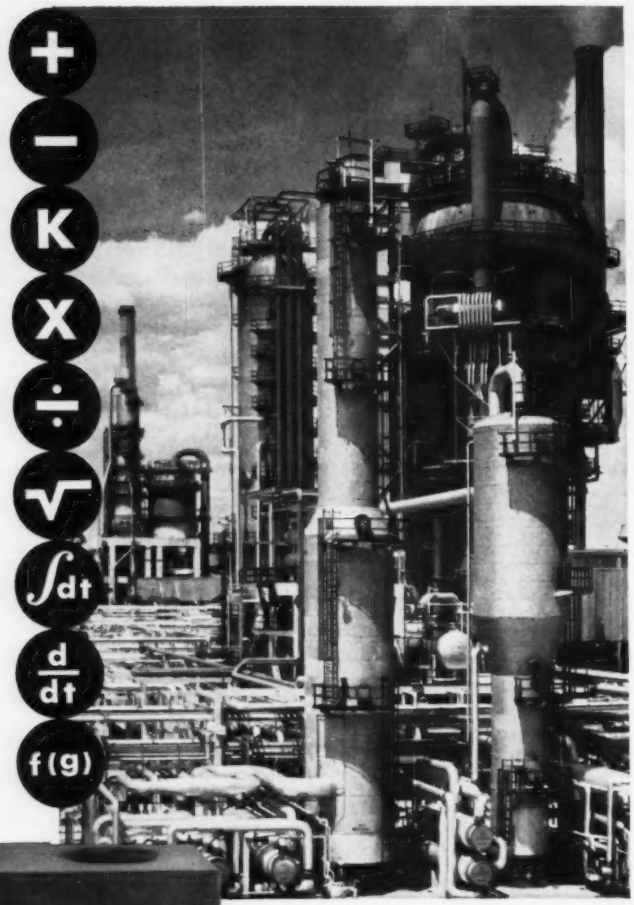

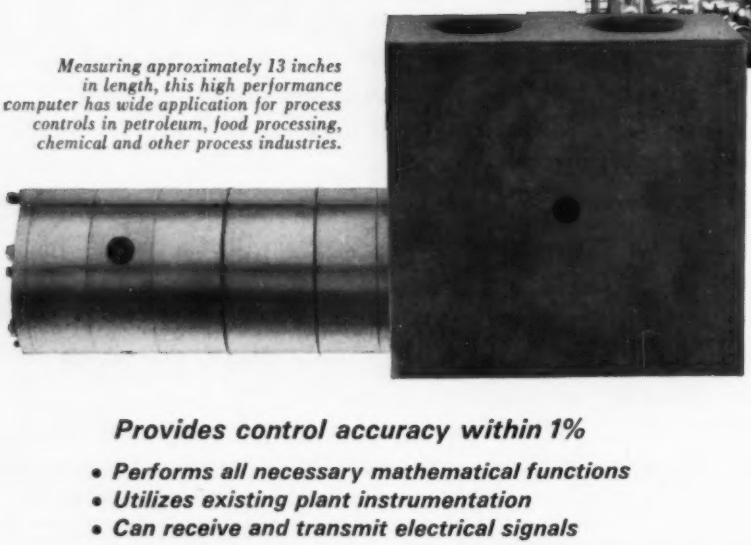

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LETTERS

Add Cesium Producer

TO THE EDITOR: As 20-year specialists in high-purity alkali metals and their technology, MSA Research Corp. (subsidiary of Mine Safety Appliances Co.) would like to be added to your list of cesium producers (*CW, Aug. 5, p. 116*). We produce sodium-potassium alloy, potassium metal of commercial and high-purity (99.97%) grade, rubidium, and high-purity cesium (99.9%) metal.

The present cesium price reflects the demand for high-purity materials for experimental uses, which in turn requires extensive handling and treatment of small quantities of highly reactive material.

Space-age studies of potassium, rubidium and cesium are bound to trigger new uses and potential markets. Commercial uses could expand faster than space uses if practical evaluation of metal-derived organometallics proves out. High purity may not be necessary, as chemical properties are so similar that mixtures of alkali metals might be used.

Alloys of the alkali metals have particularly useful properties as they remain liquid to low temperatures. The 23% potassium (by weight) alloy of cesium melts at —48 C.

JOHN H. MADAUS
Marketing Division
MSA Research Corp.
Callery, Pa.

Vitro in India

TO THE EDITOR: Your special report on India (*Sept. 23 p. 65*) was a good one, and let me extend our congratulations.

We have been active in India for some time now, and can attest to the fact that it is difficult to put down in writing a meaningful summary of the chemical situation in India.

I thought your comments on the Indian fertilizer situation were completely well taken. One thing you might have included was reference to the fact that Raymond Ewell, Vice-Chancellor for Research, University of Buffalo, conducted a survey of the fertilizer situation in India under the auspices of The Ford Foundation. We feel that his report, along with the United Nations report, which you mention, provides a very factual commentary on the Indian fertilizer situation.

I would like to record one minor comment in regard to your reference to our work with the Khatau organization in connection with the planned methanol-formaldehyde unit. Vitro has, at no time, considered equity participation in this project. We have worked with the Khatau organization in developing the necessary technical information for their government of India license application and have contacted a number of United States organizations in terms of licensing technical know-how and in regard to limited equity participation. In fact, we are currently making arrangements for the principal of the Indian organization to visit the U.S. for detailed discussions with interested organizations here.

One additional point is the fact that we have received a preliminary assurance from the Trombay refineries in regard to the supply of refinery off-gases as a feed for the proposed unit. This, of course, cannot be confirmed until assurance by the government of India of the required industrial license.

ROBERT B. LOWTON
Vitro International
New York

Sindri Fertilizer Plant

TO THE EDITOR: . . . You report that "damages" are being collected from Montecatini by the Indian-owned Sindri Fertilizer Factory because the plant "has fallen far short of meeting promised designed rated capacities" (*Sept. 9, p. 34*).

Actual facts are these:

Only the double salt production was less than the contracted capacity. This lower production was due to the unsatisfactory performance of the sulfate concentration unit, designed and supplied by another firm, which paid a penalty. The penalty was transferred to Sindri Fertilizer. After proper plant modifications, trials were later carried out successfully at Sindri, and the rated double salt capacity is now higher than that indicated in the contract.

The Suez crisis, the modification of the double salt plant and some other causes attributable to Sindri Fertilizer delayed commissioning of

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the plant to Sept. 24, '59, and therefore it is not right to consider total production of 1959-60 as reference figures.

Furthermore the plants have not been operating at rated capacity because raw materials coming from pre-existing units such as sulfate liquor, coke-oven gas, etc., were in short supply. Therefore the full capacity of the plants designed by Montecatini was not utilized because of factors outside the control and responsibility of Montecatini. . . .

BARTOLOMEO ORSONI
Montecatini
Milano, Italy

Paper-Coating Latexes

TO THE EDITOR: [In] your article "Coated Papers Roll Up Gains for Latex" (*Sept. 9, p. 79*) . . . our company was left unmentioned.

We have carried on, for some time, a substantial program on paper coating latices of the butadiene-styrene type. . . .

ARTHUR NOLAN
General Sales Manager
Chemical Division
International Latex Corp.
Dover, Del.

Salaries Too High?

TO THE EDITOR: Re your Viewpoint "How to Cope with Imports" (*Sept. 2, p. 7*).

Without taking the side of the labor unions, I feel that the high cost of selling, the comparatively high salaries for professional workers employed in research and development departments, and the extreme expenditures for advertising and promotion in this country have contributed to the increasing disadvantage of the U.S. manufacturers against their European and Japanese counterparts. This was particularly highlighted by one of your recent articles on salaries paid to chemical engineers in the U.S. and Europe.

To give justice, I do not think that the high wages alone can be considered the cause for the fact that American steel and chemical companies outpriced themselves overseas.

E. O. ROHARDT
Sales Representative
Hostachem Corp.
Chicago

MEETINGS

Midwest Feed Manufacturers' Assn., centennial nutrition conference, Hotel Muehlebach, Kansas City, Mo., Oct. 21-25.

Society for Advancement of Management, third annual management leadership conference, Morris Inn, Notre Dame University, Oct. 22-27.

American Coke & Coal Chemicals Institute, annual meeting, Greenbrier, White Sulphur Springs, W. Va., Oct. 23-24.

Metallurgical Society of American Institute of Mechanical Engineers, fall meeting, Pick Fort Shelby Hotel, Detroit, Oct. 23-26.

American Society for Metals, 43rd national metal congress and exposition, Cobo Hall, Detroit, Oct. 23-27.

The Engineers' Society of Western Pennsylvania, international water conference, 22nd annual meeting, Penn-Sheraton Hotel, Pittsburgh, Oct. 23-25.

International Scientific Radio Union and **Institute of Radio Engineers,** '61 joint fall meeting, University of Texas, Oct. 23-25.

First Inter-American Congress of Chemical Engineering, Institute of Chemical Engineers of Puerto Rico, San Juan, P.R., Oct. 23-28.

National Assn. of Corrosion Engineers, NACE South Central regional meeting, Shamrock Hotel, Houston, Oct. 24-27.

National Assn. of Purchasing Agents, eighth district conference, Essex House Hotel, Newark, N.J., Oct. 25-27.

Armour Research Foundation, '61 computer application symposium, Morrison Hotel, Chicago, Oct. 25-26.

Western Petroleum Refiners Assn., annual question-and-answer session on refining technology, Rufus Garrett Hotel, El Dorado, Ark., Oct. 25-26.

American Ceramic Society, 14th Pacific Coast regional meeting and electronics division, Jack Tai Hotel, San Francisco, Oct. 25-28.

Assn., of American Battery Manufacturers, Inc., '61 fall convention, The Palmer House, Chicago, Oct. 25-27.

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 W. 42nd St., New Yorfl 36, N.Y.

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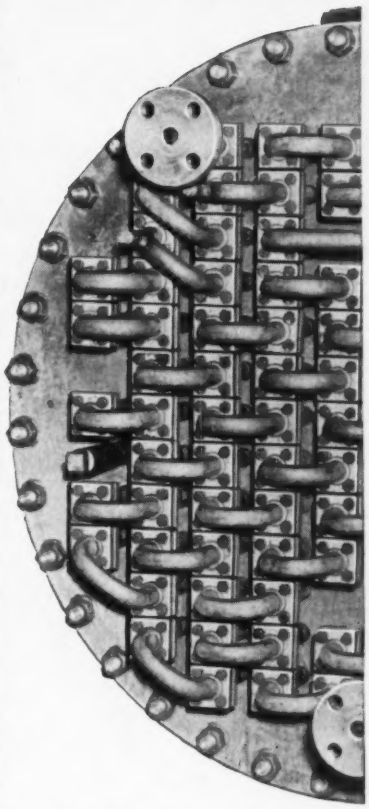

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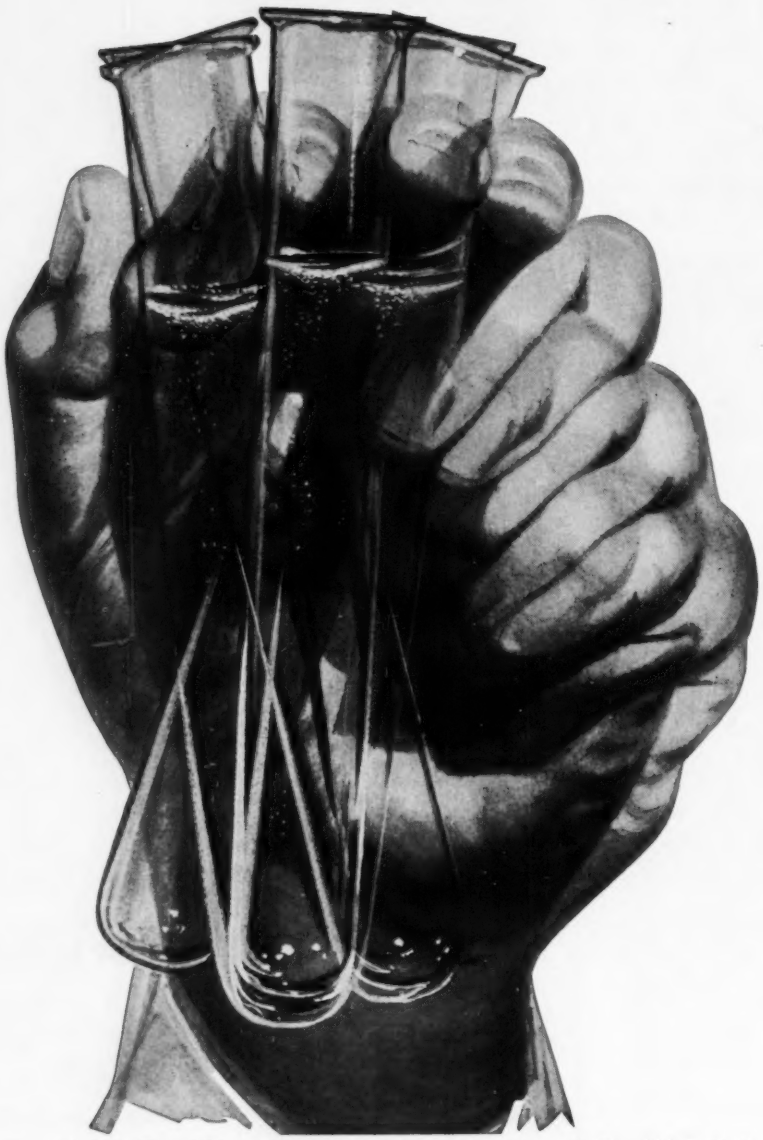

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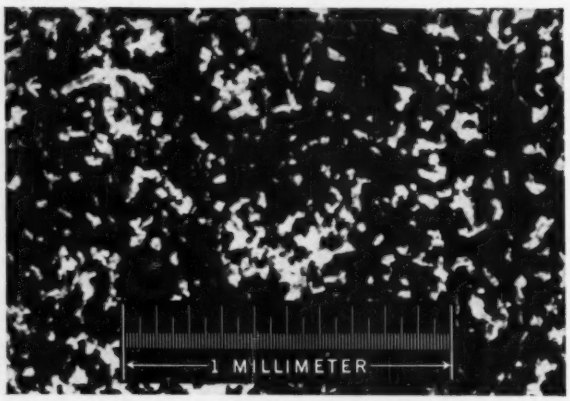
42 Mesh	Trace	200 Mesh	35.0%
100 Mesh	.5%	325 Mesh	70.0%
170 Mesh	20.0%	400 Mesh	80.0%



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TYPICAL SCREEN ANALYSIS
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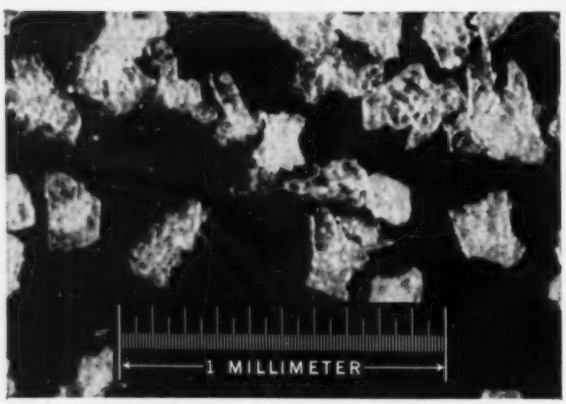
170 Mesh	Trace	325 Mesh	25.0%
200 Mesh	2.0%	400 Mesh	45.0%



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TYPICAL SCREEN ANALYSIS
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65 Mesh	27.0%	170 Mesh	99.0%
80 Mesh	66.5%		

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TYPICAL SCREEN ANALYSIS
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42 Mesh	Trace	200 Mesh	35.0%
100 Mesh	.5%	325 Mesh	70.0%
170 Mesh	20.0%	400 Mesh	80.0%

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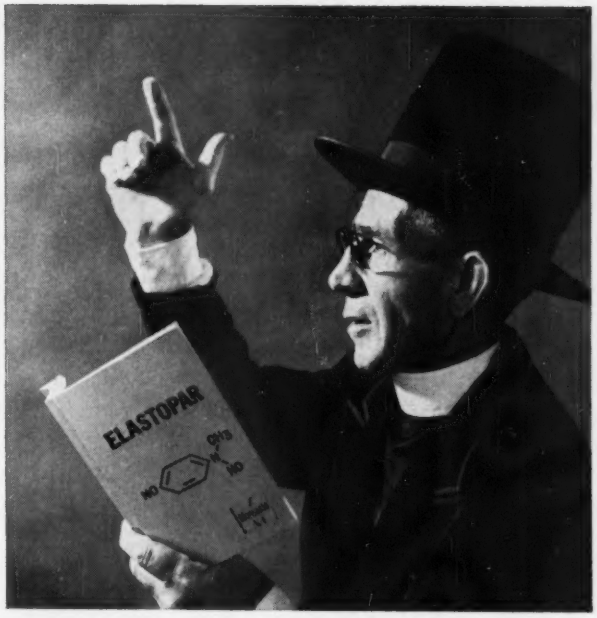

Something more than a ripple of excitement has been started in the polymer field—by the recently discovered, and altogether novel action of Elastopar on reinforcing agents! Little known to chemists outside the rubber compounding field, Elastopar has now been found to create chemical bonds where only mechanical bonds existed before. This unique property appears to have a variety of polymer applications far beyond its obvious values in the rubber field.

Elastopar is a highly reactive compound originally developed to modify the normal linking pattern of butyl rubber. With as little as 0.5 to 1.50% milled into a butyl rubber compound, the cured rubber develops improved resilience, much higher modulus, increased abrasion resistance. In fact, under *ordinary* processing conditions, the butyl rubber compounds turn out with far better properties than formerly could be obtained with slow, expensive heat treatment.

Some of Elastopar's property improvements in butyl polymer compounds—*better elasticity, lower heat build-up under flexing, reduced cold flow of uncured stock*—pointed to its effect on the polymer's linkage. Subsequent research disclosed two surprising facts. The presence of the compound actually does not affect the linkage pattern between reactive sites on a polymer. Not only that—it promotes a *chemical linkage* between the polymer and reactive sites on the *reinforcing carbon!*

The values of such a "linkage promoter" in rubber polymers quickly become apparent. For example, natural rubber can be more efficiently joined to SBR synthetic rubber—to make a tire compound that costs less, yet has performance equal to an all-natural rubber tire. As much as 20-40% natural rubber in a tire compound can be replaced by lower-cost SBR.

But what may be the effect of Elastopar on *other* polymers, and on other resin-filler systems? Since the action of Elastopar is to establish chemical bonding between unsaturated reactive sites, it would seem that by the use of small quantities in processing, *chemical* bonds can be set up where only *mechanical* bonds existed before! Thus, depending upon the polymers (and fillers) used, altogether new materials or new, improved properties can be created. As one polymer chemist puts it: "If Elastopar turns out to be a marrying parson between a wide variety of polymers, you're going to see a proliferation of new materials that will make you dizzy!"

Chemically, Elastopar is N,4-dinitroso-N-methyl aniline. It is so highly reactive that it is shipped as a safe-to-handle 33% mixture with an inert diluent. It is this high reactivity that makes Elastopar a "linkage promoter."

In the current jungle of copolymers, terpolymers, graft polymers formulated with all kinds of "fillers," the advent of a powerful, versatile linkage promoter can indeed provide new materials with unusual properties. Any polymer system containing unsaturated bonds (or other reactive sites), *even in low amounts*, may be amenable to a linking reaction with Elastopar. Process temperatures and the reaction rates will doubtless vary with the polymer. Butyl rubber, for example, with a low unsaturation of 1.5–3.0% per mole, requires a temperature of 300° F. But cis-butadiene rubber, with more unsaturation, requires only 50–60° F. for reaction.

The potentials for creation of new and unusual compositions are virtually boundless. Since Elastopar can create a modified internal structure of *pure* polymers, and can chemically link *dissimilar* polymers, and can *intralink* resins with fillers and substrates—a bewildering variety of possibilities opens up. Just consider the many applications for a resilient, rubber-modified high-impact polystyrene—or couplings of polypropylene and synthetic rubber—or the conjoining of inexpensive coumarone-indene resins with a variety of unsaturated natural or synthetic polymers. The "wedding" of dissimilar polymers with Elastopar may even be a road to *permanent plasticization!*

While a lot of "trial-and-error" work is still ahead, the possibilities are intriguing. A small concentration of Elastopar may be a means of developing chemical bonds to supplement mechanical bonds in bonding operations, such as phenolic laminates to plywood with a rubber-base cement; for polymer coatings; even for setting up chemical bonds between rubber and nylon tire cord. There's no telling what kinds of couplings the "parson" might not succeed in marrying!

For further information on Elastopar as a cross-linking promoter, request a copy of Specialty Data Report CS-15. Write to: Monsanto Chemical Company, Organic Chemicals Division, Department 4463Y, St. Louis 66, Missouri.

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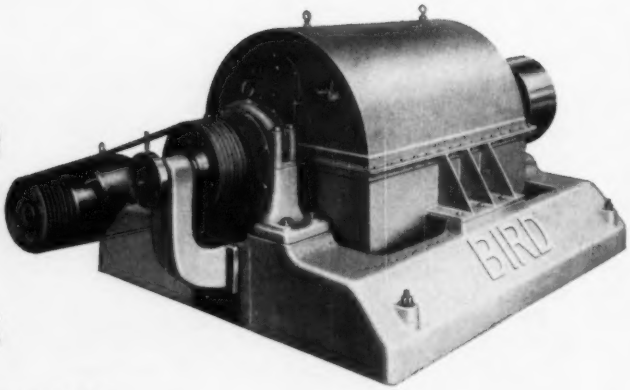

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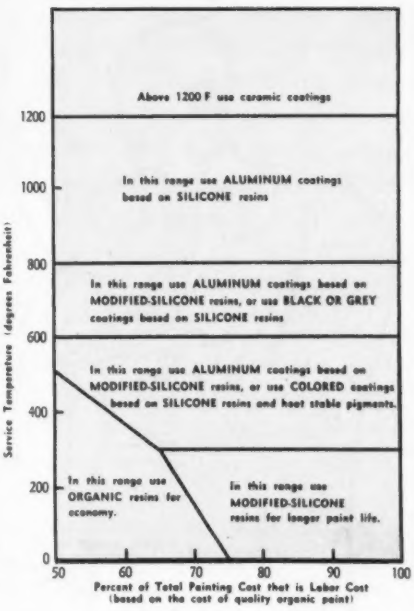
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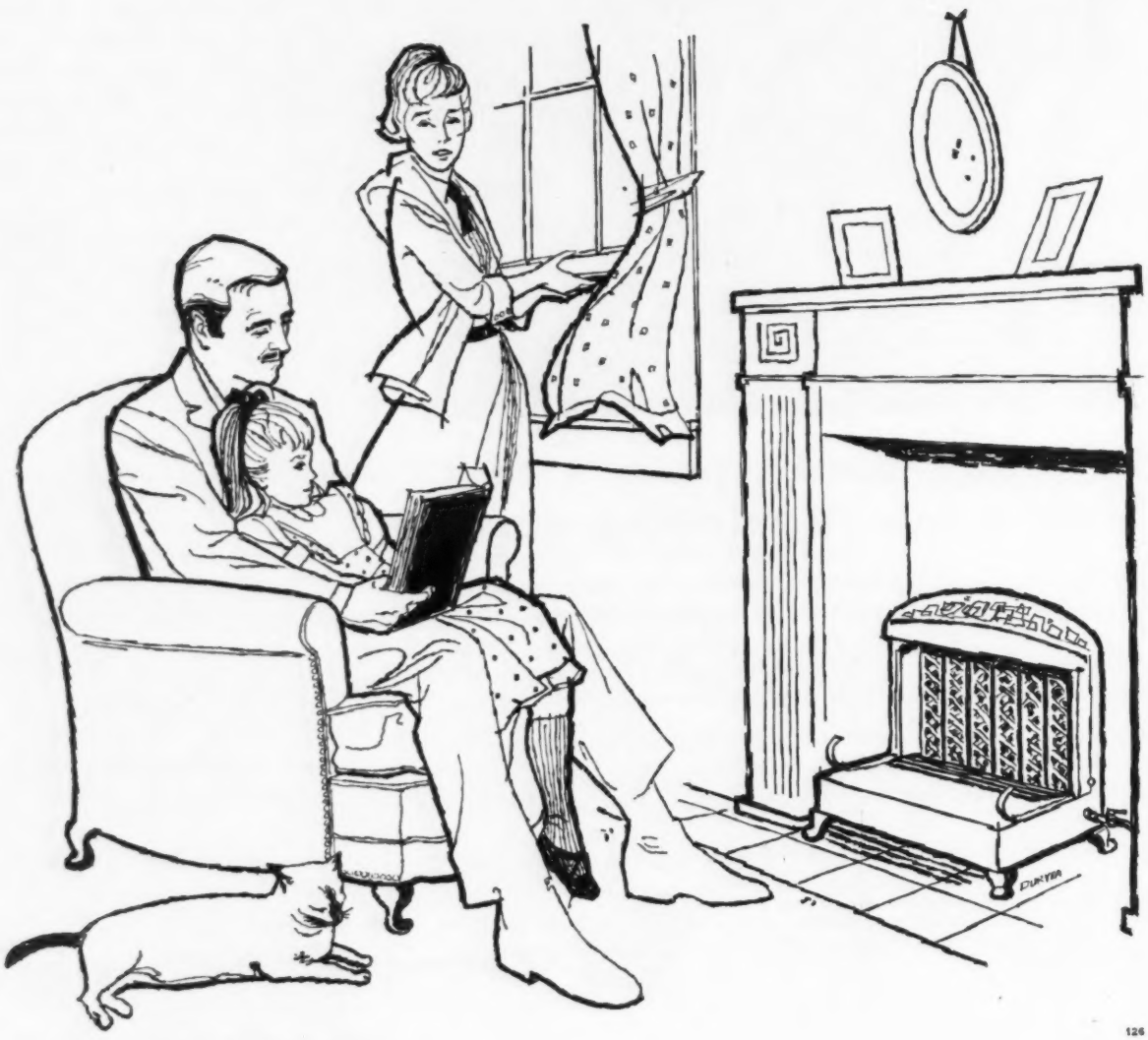

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Business
Newsletter

CHEMICAL WEEK
October 21, 1961

No definite pattern—up or down—is evident in early reports of chemical companies' third-quarter sales and earnings. Du Pont's sales in the three-month period, for instance, were up 4%, to 552 million; per-share earnings increased 7.7%, to $2.11. Dow's sales, in its three months ended Aug. 31, inched up 0.8%, to $210 million, but net income dropped 5.9%, to $17.7 million.

Allied Chemical's sales and earnings were both off—sales down 3.4%, to $181.2 million; earnings down 2.9%, to $10.4 million. Hercules Powder's third-quarter sales moved up 9.5%, to $97.3 million, but per-share earnings slipped 82¢—off 3.5%. On the other hand, Hooker and Monsanto gained in each category: Hooker's sales were up 0.4%, to $37.4 million, and earnings up 3.2, to $2.99 million; Monsanto's sales reached $229.3 million, up 5.1%, and earnings were $15.5 million, up 1.1%.

Sales in the industry as a whole in August climbed 10.8%, for a chemicals and allied products total of $266 billion. This, reports the U.S. Dept. of Commerce, brings the industry's eight-month total to $19.48 billion—up 4.4% from the year-ago figure, despite a poor January and February this year.

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Sun Oil will sell its Houdry Process Corp. stock to Air Products and Chemicals. First reports (*CW Business Newsletter, Oct. 14*) were jointly confirmed this week by Leonard Pool, president of Air Products; Clarence Thayer, senior vice-president of Sun; and Theodore Burtis, president of Houdry.

The offer calls for cash payment for half of Sun's Houdry shares (80,000) and an exchange of Air Products stock for Houdry shares on a one-for-one basis for Sun's remaining 80,000. But Air Products won't stop there. It will shortly make the same one-for-one exchange offer to other Houdry stockholders, holding approximately 183,450 shares. Intent: to merge Houdry into Air Products as an autonomous division.

The acquisition would also include stock of Catalytic Construction, a wholly owned Houdry subsidiary. Under the projected setup, Catalytic would operate as a separate, wholly owned subsidiary of Air Products, but with Houdry having general responsibility for its operations.

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Seadrift, Tex., has been chosen as the site for National Starch and Chemical's $4-million, 45-million-lbs./year vinyl acetate monomer plant. The industry had a field day speculating on the unit's eventual location when news of the project broke (*CW Business Newsletter, Aug. 5*). Construction of the new plant, by Brown & Root (Houston), will begin late this year, be completed in about a year.

Acetylene, to be used in the vinyl acetate manufacture, will come from Union Carbide Olefins, a division of Union Carbide Corp.

The government's helium recovery program is barreling along. This week there's word that a $25-million extraction plant will be built (in Liberal, Kan.) by National Helium Corp., a 50-50-owned Panhandle Eastern Pipeline-National Distillers company. Output, about 1 billion cu.ft./year, will be sold to the government under a 20-year contract with the Dept. of Interior. The unit will probably be operating by next summer.

Other privately financed, constructed and owned helium extraction plants to be operated under U.S. purchase contracts include Helex Co.'s Bushton, Kan., plant (to be operating by Jan. '62) and Cities Service Helex's Ulysses, Kan., plant due in early '63 (*CW, Sept. 9, p. 57*).

In addition, Kerr-McGee's 200,000-standard cu.ft./day plant near Navajo, Ariz., will soon be supplying commercial, nongovernment markets.

•

Nopco Chemical will soon disclose that it has selected Linden, N.J., as the site for its new toluene diisocyanate venture. Actually, construction has already begun on the $7-million, 10-million-lbs./year Bechtel Corp.-designed plant reported last year (*CW, Nov. 12, '60, p. 114*).

•

Canada will have its first diisocyanates plant by late '62. The "multimillion-dollar" plant, to supply Canadian markets, will be built by Allied Chemical Canada, Ltd.

Although the company is vague as to precise location—says only that the plant will be constructed "in Ontario"—chances are the unit will go up near Sarnia. Some months ago (*CW Business Newsletter, Feb. 11*) Allied Canada picked up its option on 180 acres on the St. Clair River, about five miles south of Sarnia. At that time the firm would not say what use it would make of the land.

No official details are available on size of the projected plant nor on source of toluene needed for the diisocyanates operation, but trade sources say capacity will likely be in the 10-15-million-lbs./year range and that toluene may come from Imperial Oil, which is now installing a Udex benzene unit at Sarnia.

•

Canada may join the European Common Market and it could be a blow to U.S. chemical companies. The move, said Canada's Trade Minister George Hees last week, "is being considered." The country is also thinking about a North Atlantic trade bloc (to include Canada, the U.S., Britain, and the Common Market countries) as another possible way out of its trade dilemma.

There's one big stumbling block, though—Canada's relatively weak industry may not be able to stand up under tariff-free competition.

If Canada did join the Common Market, it would hurt U.S. chemical firms, since that country is their biggest export customer. Last year, for instance, Canada bought $277.1 million worth of U.S. chemicals.

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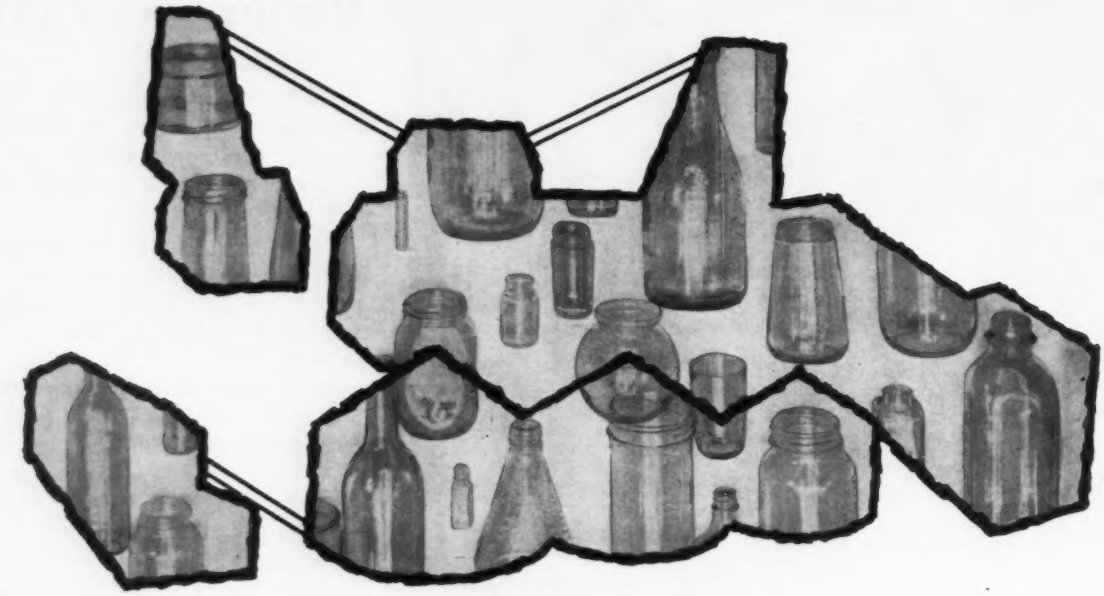

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General Tire's O'Neil, Mobay's Mahoney: Heading for a showdown.

Flare-up over Foam

Next month in Washington, lawyers for Mobay Chemical Co. (Pittsburgh) and General Tire and Rubber Co. (Akron, O.) will present their arguments in a U.S. Patent Office interference proceeding that may clear up a major question troubling the urethane foam industry: Who owns the vital know-how for polyether elastomers?

Meanwhile, foam producers and the chemical companies that supply the principal raw materials for making such products are in suspense.

Immediate cause of this fluster: Union Carbide Chemicals Co.'s recent purchase of rights under the "Price patent" (U.S. No. 2,866,774). Carbide is giving General Tire an undisclosed lump sum, and receives a paid-up, nonexclusive license with the right to grant sublicenses.

A portion of the payment goes to Prof. Charles C. Price, who directed the research that led to the granting of that patent Dec. 30, '58; another share goes to the University of Notre Dame, where that research work was done. The rest is being kept by General Tire "as reimbursement for its support of the research and other expenses in connection with the patent and its enforcement."

Carbide Plays It Safe: It's General's intention to try to enforce the Price patent that is impelling foam producers and their raw-materials suppliers to take a stand on the patent dispute just as the interference proceeding is coming to a showdown.

Union Carbide decided to play it safe, bought the license. This will protect its customers from any infringement suits that General might otherwise file if the Price patent is upheld. It also averts any possible suit by General against Carbide for contributory infringement.

Other suppliers of polyethers and polyols—such as Dow Chemical, Olin Mathieson, and Wyandotte Chemicals—have refused to take out such licenses. In effect, they are betting that Mobay will win out in the interference proceeding. Dow, Olin, Wyandotte and certain other suppliers have been shouldering the risk for their customers by inserting in sales contracts a "hold harmless" clause; this guarantees that the foam maker will not lose money through infringement suits based on the Price patent.

Some Seek 'Equalizer': But one immediate question in the industry is whether such a "hold harmless" clause will be enough to satisfy the customers. Foam producers—of whom there are an estimated 40-45 in the U.S.—are well aware that General Tire's Plastics Division is one of their major competitors; they know that it buys substantial quantities of Carbide's Niax polyols; and they know that at least some patent lawyers in the industry are betting on Mobay.

Putting these facts together, a few foam producers have started clamoring that Carbide's royalty payment is equivalent to a discount for General Tire on its polyol purchases from Carbide.

Other foam makers, however, accept the move as a reasonable one. Carbide firmly denies any "rebate" intentions, points out that its payments are for a limited amount and can be suspended if the Price patent is not upheld.

At least one rival polyether producer bent an ear to the complaint. Said Jefferson Chemical: "We realize that our customers cannot pay us a premium. We are indicating to them at the present time that we intend to remain competitive."

Producers Standing Pat: While this could be construed as readiness to reduce prices on polyols to equalize the alleged price advantage for General Tire, other polyol producers indicated to CHEMICAL WEEK that they expected to stand pat on present price schedules. Making a price cut now, one producer remarked, would be "like getting on a treadmill, because Carbide would match that cut and then our customers would want a further reduction."

Price—who now is chemistry department chairman at the University of Pennsylvania—says the research behind his patent started back in '48. At that time the National Academy of Science-Quartermaster Advisory Committee on Elastomers asked him to organize a meeting of scientists to suggest a new approach in the search for "superior new rubbery materials serviceable at low temperatures and resistant to organic solvents."

Following that meeting, Price says, he launched a series of experiments at Notre Dame on preparing urethane foams based on polyethers, instead of the polyester glycols then in use in other urethane foams. In particular, he worked with poly(propylene oxide). This approach led to

quick success, he continues. A patent application was filed Sept. 23, '53.

Conflicting Claims: Mobay—a joint subsidiary of Monsanto Chemical (St. Louis) and West Germany's Farbenfabriken Bayer—was just being organized then. But as soon as it was incorporated, it took over rights to two earlier patent applications: one filed May 6, '52, by Bayer; and one filed in '53, just a few weeks before the Price application, by Monsanto.

That first filing resulted in the issue of the "Windemuth patent," assigned 50-50 to Mobay and Bayer, last Aug. 9. It describes a process for making urethane polymers by reacting a polyalkylene ether having two or more hydroxyl groups and molecular weight of at least 500 with an organic isocyanate. The '53 filing—by researchers James H. Saunders and Herbert L. Heiss, now with Mobay—reportedly includes claims similar to some of the Price patent claims, relating to use of poly(propylene oxide) as a starting material.

These Mobay claims appear to be the basis for the interference proceeding, which has been a source of concern in the urethane industry ever since. Both sides have given their testimony, and the next step is for the lawyers to make their final arguments before the Patent Office's Board of Interference Examiners. This three-member board will consider two basic questions: (1) whether an interference is justified; and (2) whether Mobay has a prior claim.

This board's decision is expected late next spring or early next fall, and it can be appealed to a court —probably the U.S. Court of Customs and Patent Appeals, in Washington.

Chemistry Prof. Price: He claims priority on poly(propylene oxide) foams.

No Direct Threat: Meanwhile, there is now no direct legal threat to urethane foam producers as they seek to capitalize on recent developments that give promise of rapid market growth (*CW, June 3, p. 79*). Foam makers who buy polyols from Union Carbide Chemicals are getting royalty-free sublicenses; those who buy from other suppliers are getting hold-harmless protection; and Mobay's policy is to give royalty-free licenses.

If the Price patent is upheld, the only major difference it will make is that other polyol producers will just about have to come to terms with General Tire if they want to stay in the business. This probably wouldn't be too painful. Carbide's lump-sum payment is described as "relatively modest"; and the asking price will probably be going down as the patent approaches its date of expiration and as new technology comes along.

Doubling Up in Chlorine

A second chlorine-caustic plant for New Brunswick, Can., was shaping up this week. Industrialist K. C. Irving, who first voiced plans for such a unit two years ago, is apparently determined to carry them out—despite the recent decision by Canadian Industries Ltd. to build a 45-tons/day plant in the Newcastle, N.B., area.

Irving's intentions are indicated by his failure—so far—to sign up for some of CIL's output. However, the go-ahead decision on CIL's project probably means that Irving's proposed chlorine-caustic output would have to be captively consumed in his kraft and sulfite paper mills at St. John, N.B. Estimated capacity of his still-unconfirmed plant—delayed at this time by a question of water rights—is about 45 tons/day.

CIL's venture—using raw material from Canadian Salt's rock salt mine in Nova Scotia—may be tied up with a Nova Scotia Pulp Ltd. mill now under construction at Port Hawkesbury, N.S., about 200 miles from Newcastle via the Northumberland Strait. The Newcastle location also enables CIL to ship to its other big customers in the Atlantic provinces—Fraser Companies and Gaspedial Sulphite—with minimal freight charges.

Wrangle in Morocco

Morocco's plans to build a phosphate fertilizer complex at Safi (CW, Sept. 24, '60, p. 24) have exploded into a political and legal wrangle involving U.S. and other foreign engineering companies.

Setting for the feud is the libel suit brought by Morocco's Interior Minister against the Moroccan Labor Federation's organ *Avant Garde* for its attacks on Economy Minister Mohammed Douiri.

The trial opened Oct. 10, and promptly turned into a scathing condemnation of the government's handling of the $50-million Safi project. The defense case is based on two letters allegedly written by Douglas Reybold, vice-president of Dorr-Oliver Inc. (Stamford, Conn.), to the Premier's office protesting irregularities in awarding the Safi contracts.

Bribes Asked: *Avant Garde* reported that Reybold had asserted in the letters that intermediaries close to Mehdi Abdeljalil, director of the National Bureau d'Etudes et de Participations Industrielles (BEPI), which is charged with supervising the Safi project, had demanded a commission of 1.5% of the project's cost for themselves and 10% more to be deposited in a Swiss bank.

Reybold's letter was also reported by *Avant Garde* to have charged that Douiri ignored technicians' recommendations that a single firm should have over-all responsibility for the project and that he rejected the results of international bidding a year ago for building the entire project.

Splitting It Up: In April the minister awarded the sulfuric acid plant contract to Lurgi, the phosphoric acid plant contract to Dorr-Oliver, and the triple superphosphate plant contract to Krebs, with the three companies to hold joint responsibility for the entire project. The companies met in August and decided they couldn't guarantee each other's installations, and proposed that the government should therefore guarantee making good on the project's total cost. BEPI head Abdeljalil countered with a protocol which Dorr-Oliver rejected because it contained no statement of total cost and because Morocco couldn't assume the heavy technical and financial responsibilities involved.

In Reybold's second letter (dated Sept. 22), according to *Avant Garde*, Reybold said he was amazed by Douiri's announcement that Blaw-Knox Co. had been chosen to supervise the entire Safi project.

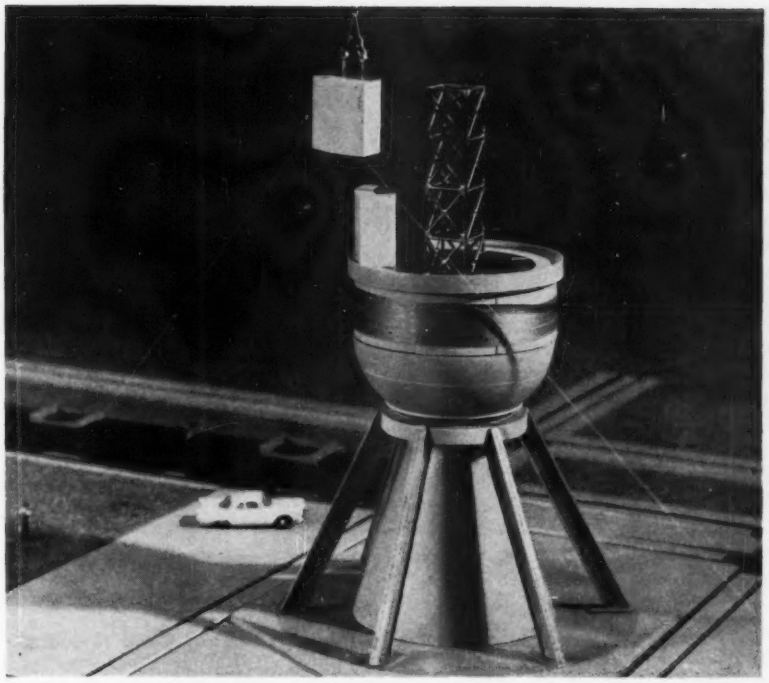
Letters to the King: In his home office, Reybold acknowledged to CHEMICAL WEEK that he had written letters containing these general ideas. But they were addressed to the King, Reybold says, who is supposed to have ultimate responsibility. The letters, Reybold says, were in the form of requests for clarification about what was going on and what procedures to take. Dorr-Oliver was asked for graft, he says, but not by Moroccans.

In his letter to the King, according to Reybold, he expressed "confusion" over what Blaw-Knox's role in the project was to be, and raised the question of whether Blaw-Knox had enough experience in this type of plant, and whether its participation would raise the project's total cost. He pointed out that the three companies would probably refuse to share their know-how with Blaw-Knox, and that Blaw-Knox couldn't be a substitute for government authority.

A Blaw-Knox official told CHEMICAL WEEK this week that "because of its experience and qualifications, Blaw-Knox was approached by the Moroccan government to act for it in a consulting capacity." A contract, he says, will almost certainly be signed.

Backed Up: At the trial, BEPI technicians on the project confirmed the charges reported by *Avant Garde*. One engineer testified that 60 foreign and Moroccan technicians had agreed on the necessity for one firm being responsible prime contractor. The Dorr-Oliver-Monsanto $24-million bid for the entire project was the best by far, he testified, because Lurgi's $32-million bid was too high and Krebs lacked the experience.

Former Economy Minister Abderrahim Bouabid, who initiated the Safi project, took the stand and testified that "Morocco's prestige is at stake." He questioned the government's silence on Dorr-Oliver's letters, criticized the government's breaking of international bidding procedures to carry on secret negotiations, and asked why the committee announced by the King last May to examine the Safi project had never been formed.



For bigger 'solid' boosters, Hercules advocates glass-fiber girdles.

Urging New Ideas for Space

New concepts in propellant production and use, as well as for administration of the entire U.S. rocket and missile program were proposed at last week's 16th annual meeting of the American Rocket Society.

"Space Flight Report to the Nation," was the first ARS annual meeting to be held on an open-to-the-public basis. It was staged in New York City's Coliseum, in conjunction with an astronautical exposition of rocket materials, devices and equipment that took up the first three floors of the block-square building.

Chemical companies — particularly the ones active in research and production of propellants—were prominently represented by both personnel and products in the week-long affair. Among the chemical exhibitors in the exposition: Aerojet-General, Allied Chemical, Amcel Propulsion (Celanese), Atlantic Research, Beryllium Corp., Callery Chemical, B. F. Goodrich, Grand Central Rocket, Hercules Powder, Linde Co. division of Union Carbide, Ramset Division of Olin Mathieson, Stauffer Chemical, Thiokol (*see p. 24*), and Vitro Corp.

Rocket Wrap: Hercules showed off a model of a novel concept of assembling large solid-propellant rockets (*photo, above*). This method employs formed-at-the-site resin-impregnated glass fiber to hold propellant layers in place and to prevent bulging. It permits use of presently known materials and manufacturing techniques, yet does not impose any limit on size of the rockets, according to Hercules' Chemical Propulsion Division. And after the propellant segments have been piled up to the desired height, the entire structure is encased on the spot in a filament-wound glass-fiber case bonded by epoxy resins.

Big rockets, no matter how they are assembled, will demand a vast poundage of solid propellants, says T. E. Myers, general manager of Rocketdyne's Solid Rocket Division—120 million lbs./year may be the consumption level in a few years, he says.

Myers, outlining current trends in the application of solid propellants to space-vehicle systems, notes that solids are candidates for large-booster application and that unconventional rocket motor designs offer the most promising approach to putting solid propellants to work in the upper stages of pro-

posed lunar vehicles. The concept of a consumable case, he adds, is the most feasible one that has been developed so far.

Another possible improvement in solid propellants: addition of beryllium. Says Myers: "For immediate application to space vehicle propulsion, no single ingredient can provide as large an increase in performance as beryllium." Problems of toxicity have delayed utilization of this metal in propellants, he admits, but this powerful additive now can be used for the upper stages of space vehicles. And use of beryllium in a single upper stage would reduce the weight of a typical lunar mission by as much as 6,500 lbs. Thus, light metals, rather than more costly chemical additives, will get the inside track for such missions, Myers predicts.

Rocketdyne scientist H. O. Noeske reported that a mixture of lithium and hydrogen can be used to increase the efficiency of an arcjet space engine by as much as 25% over the performance obtainable with pure hydrogen.

An increased "efficiency" in the awarding of government contracts was the object of Executive Vice-President Simon Ramo's (Thompson Ramo Wooldridge) suggestion for a continuous performance rating system to be used to evaluate the work done by contract holders.

Ramo says that his suggestion may not be the best solution, but that some new arrangement is needed. At present, he contends, defense contractors tend to put too many of their "smartest people" to work on drafting proposals for new contracts, instead of working on the contracts already awarded.

A possible major shift in space program contracting was implied in remarks by Director James Webb of National Aeronautics & Space Administration and by Wernher von Braun, director of NASA's Huntsville, Ala., installation. They said NASA will try to decide by Christmas whether to switch from the "nonstop" Nova vehicle for the men-to-the-moon project to a "shuttle" plan that would require rendezvous with a staging vehicle in intermediate orbit before taking off on the main mission.

As to use of solid or liquid propellants in NASA's largest boosters, Webb said the agency is carrying out development work for whatever time is needed for evaluation.

Seeking New Markets via Chemical Acquisitions

Rocket operations will continue to grow, but Thiokol feels that it's time to cash in on its reputation, diversify by acquiring companies and expanding product lines.

Thiokol Chemical Corp. (Trenton, N.J.), continuing its campaign to boost sales and earnings by expanding and diversifying its chemical activities, this week neared windup of negotiations for a CPI company it has courted for several weeks.

Already, the groundwork is being laid for further mushrooming of its network of divisions, subsidiaries and cooperative ventures in chemicals and plastics. This recently organized group includes Shawnee Industries Inc. (Shawnee, Okla.), Hi-Polymer Corp. (Hudson, Mass.) and Trackmaster Corp. (Logan, Utah).

Time To Move: The reasoning behind Thiokol's increased interest in chemicals and plastics is simple—they offer a wider profit margin and better stability than the rocket field. Thiokol is by no means slackening its pace in rocketry; it has big plans for that area too. But company officials recognize that in 10 years much of the glamor will have worn off the propellant industry, and they want to cash in on their reputation now. So they have formed a long-range plan to build up nonmilitary business.

And Thiokol's success in the Minuteman, Pershing, Nike Zeus, X-15 and other programs has made its securities highly marketable, which gives it a strong position in its expansion ventures.

Sales Target: Thiokol sales last year were $171.5 million. President J. W. Crosby expects $190 million in '61 and looks for his long-range growth program to push the figure to $500 million within 5-6 years.

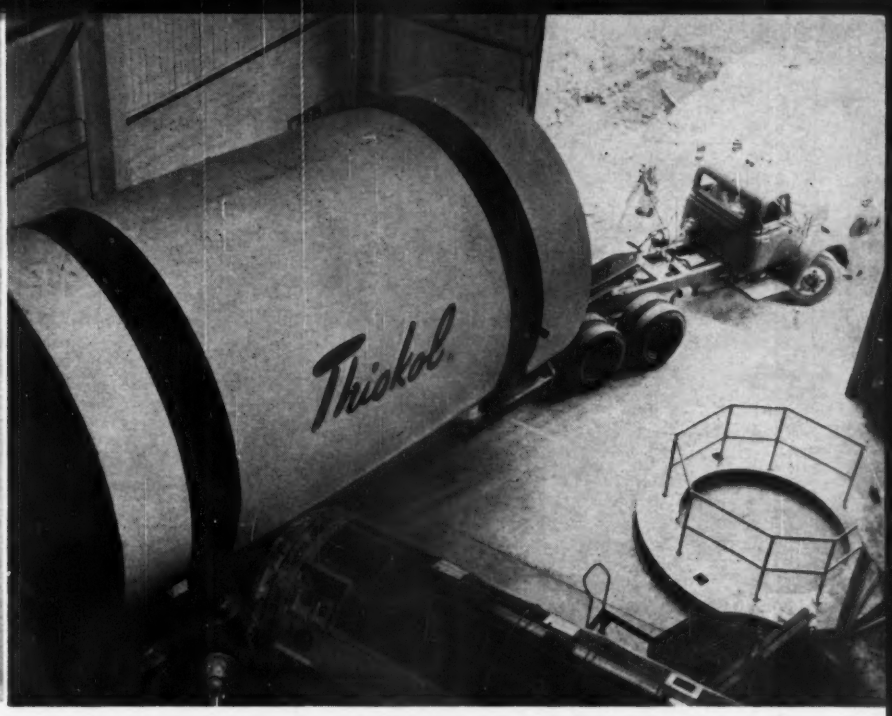
And acquisition, an old story to Thiokol, will play a big part in this advance. In '57 it bought National Electronics Labs, and later acquired Reaction Motors Inc., the country's first rocket-engine development company (and a backer of liquid fuels, as opposed to Thiokol's solid-fuel policy of the time).

The current diversification program places emphasis on "moving next door" into closely related fields, rather than exploring unrelated areas, as some other diversified companies have preferred. Only exception is Trackmaster, strictly a mechanically oriented company.

Hi-Polymer was bought basically to get the rights to make and market its acrylic elastomers; Thiokol's Chemical Operations Division now produces them under the Thiacril trademark. The elastomers complement Thiokol's line of polysulfide crude rubber, liquid polymers, urethane resins and rubber chemicals.

Shawnee Industries, in addition to making missile hardware, is active in the plastics tooling field.

Other Ventures: Two joint ventures the company had been studying have fallen through, but interest remains high in other potential operations. Thiokol had considered tying up with Cities Service to market butyl rubber, but the idea faded when Cities



Sealants: key to nonmilitary growth. At Wasatch plant, full-scale model of Nova segment in trial haul.

Service merged with Columbian Carbon.

Thiokol has extensive technical knowledge in both butyl rubber and surface coatings, and logically will continue its efforts to line up marketing facilities.

Also, Thiokol's plans to increase the volume of its elastomer production make a venture with a petrochemical supplier logical; negotiations are understood to be in progress.

Liquid Polymers: Backbone of Thiokol's expansion of existing product lines will be its polysulfide liquid polymers. These compounds, which got the company's rocket-fuel operations off the ground, have shown great growth potential in a wide variety of nonmilitary applications.

One potentially important market looms in modification of epoxy resins, to impart varying degrees of flexibility as needed. Among the prime applications: road repair and construction. Polysulfide coatings enable new layers of cement to adhere securely to old ones, thus simplifying road repair. The coatings also cut drying time from several days to only about six hours—thus permitting the job to be done overnight, with paving ready for rush-hour traffic the next morning.

This bonding action also allows installation of divider walls by adhesion directly to road surface without dowels or other fasteners. Polysulfide coatings can protect the steel framework of bridges from attack by salt applied to combat icing. Ordinarily the salt seeps through the concrete; polysulfide coating 25-30 mils thick is said to prevent this by sealing the concrete.

Consumer Products: Polysulfide bindings have found many applications in the building industry and in manufacture of boats. So far, all materials have been sold through compounders to manufacturers and professional applicators. One reason: special mixing and surface-preparing techniques are essential.

Now Thiokol is adapting many of its sealants and binders to use by do-it-yourselfers for residential repair work. Big need now is for a one-package product that would cure on contact with air or moisture. Present polymers are two-component systems, requiring careful mixing.

The largest market for polysulfide coatings, however, is in the heavy construction field. These binders have been used to waterproof curtain walls, such as those in the new Time-Life building in New York (*left-hand photo, above*).

More Fuels: Thiokol's rocket-fuel operations (about 90% of its business), despite their lower profit margins, will continue to bulk large in the firm's plans. To prove that it can handle the huge segments necessary to build a Nova-type rocket engine, Thiokol's Wasatch Division (Brigham City, Utah) recently tried out a full-scale rocket dummy in its production facilities (*right-hand photo, above*). Five of these 20-ft. segments would be joined at the launching site to form one of the eight 160-in.-wide engines that would combine to produce 2.5-million-lbs. thrust. The company says it could have such a lunar engine ready for testing within 14-24 months, based on present technology.

The company is now looking for sites along the East Coast at which to develop and test even larger engines. Among the engines under consideration: a cluster of four one-piece engines, each 240-in. diameter, capable of thrust up to 5 million lbs.; and a 28-ft.-diameter engine capable of producing as much as 20-million-lbs. thrust.

In addition to these solid-fuel projects, Thiokol's Reaction Motors Division, which developed the engines for the X-1, X-1A, Skyrocket and X-15 research aircraft, is further researching storable-liquid systems for space vehicle control and upper-stage rockets.

With prospects for added orders from anticipated stepped up production of Minuteman engines and letting of Nova contracts, Thiokol's rocket operations loom as substantial assets for the immediate future. And the close link between research on rocket and consumer applications for Thiokol's polymers seems reason for optimism about its long-range expansion plans as well.

national roundup

Companies

Minnesota Mining and Mfg. Co. (St. Paul) is negotiating for acquisition of Di-Noc Chemical Arts (Cleveland). According to the preliminary agreement, Di-Noc shareholders will receive 0.8 share of 3M stock for each share of Di-Noc. If the transaction is approved by stockholders, Di-Noc, whose last year's sales topped $5.5 million, will continue intact. Di-Noc's major interest is its line of industrial photographic film products.

Shelley Urethane Industries (Los Angeles), foam fabricator, is acquiring Midwest Foam Products Co. (Chicago), foam producer and fabricator, in a 10-for-7 stock exchange (*CW Market Newsletter, Sept. 2*). The merged firm, with headquarters in Evanston, Ill., will be called Urethane Industries International, Inc. Total sales from two plants with combined area of 300,000 sq.ft. is $6 million. Shelley President Joseph Caplan will be the new firm's president; Midwest President George Wayson will be executive vice-president.

Expansion

Sulfuric Acid: Leonard Construction Co. (Chicago) is engineering and building a Leonard-Monsanto contact sulfuric acid plant for the recently formed Climax Chemical Co. (Houston). The Hobbs, N.M., plant, to be completed in about seven months, will use hydrogen sulfide and recovered sulfur as raw materials. Capacity: 150 tons/day.

Acetylene Derivatives; Photographic Materials: General Aniline & Film is expanding in two directions. A "multimillion-dollar" addition to its Calvert City, Ky., high-pressure acetylene plant—scheduled to begin in January—is the fourth expansion since the plant's opening.

GAF's Ansco and Ozalid photographic facilities in the Binghamton, N.Y., area will be similarly enlarged. According to Board Chairman John I. Snyder, Jr., sale of the government-owned company to private interests would not affect these plans.

Petroleum Products: A special session of the Mississippi legislature is clearing the way for the construction of Standard of California-Standard of Kentucky's oil refinery at Pascagoula, Miss. (*CW, Sept. 16, p. 76*). The legislature must ratify two constitutional amendments—one extending the period of *ad valorem* tax exemption and the other permitting sale, exchange or lease of certain lands for industrial purposes—before Stancal starts the $125-million refinery, probably this fall.

Gypsum Products: Flintkote Co. (New York) expects to complete its planned gypsum processing plant at Camden, N.J., within a year. The multimillion-dollar plant will process 165,000 tons/year of gypsum rock from Newfoundland.

Ammonia: Pure Oil (Chicago) will build a 30-tons/-day ammonia plant in Worland, Wyo., but is not ready to tell cost data or construction schedule. Stearns-Roger Mfg. Co. (Denver) is the contractor.

foreign roundup

Olefins/Germany: Union Rheinische Braunkohlen Kraftstoff AG. will build a cracking plant at Wesseling for ethylene and propylene. It's due onstream at the end of '63. Annual ethylene capacity is about 70,000 tons, mostly for Knapsack-Griesheim's use in acetaldehyde production.

Cyclic Compounds/England: Howards of Ilford Ltd. will have a new dicyclohexyl phthalate plant onstream by late '62. It is also planning a 9,000-long tons/year cyclohexanol and cyclohexanone plant. Completion is due in '63.

Vinyl Chloride/Israel: A subsidiary of Electro-Chemical Industries (Haifa) will use Monsanto's ethylene dichloride cracking process to produce vinyl chloride monomer.

Dialdehyde Starch/Italy: Miles S.p.A., a company newly formed by Miles Chemical (Elkhart, Ind.) and Ledoga S.p.A., will start research on dialdehyde starch and derivatives when its laboratory is built in Milan. Plans, now calling for eventual production of dialdehyde starch in Italy, depend on the results of the research.

ABS Resins/Scotland: Marbon Chemical (Washington, W. Va.) and Anchor Chemical (Manchester, Lancashire) plan to build a $5.6-million polymers and resins plant in Grangemouth.

Gum/Europe: Stein, Hall & Co. (New York) and Organa Trust (Milan) are forming a company to handle sales and research for Pakistan Gum Industries. The latter, in which the new company will have a major interest, was recently organized to process Pakistani guar gum for export.

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President Nasser will push Egyptian industrialization harder to help regain his damaged prestige.

U.S. Business Walks an Egyptian Tightrope

U.S. companies doing business in Egypt are walking a tightrope, in danger of being toppled by a leftward-swinging economy. They fear the loss of a sometimes lucrative market, and in some cases of their investments.

In July President Nasser's set of sweeping nationalization decrees all but killed large-scale private enterprise in the United Arab Republic. Syria's secession from the U.A.R. a few weeks ago—largely a reaction to Nasser's socialization program—added to business anxieties. It increased the chances of further turmoil in the Middle East, and made it likely that Nasser would try to reinforce his damaged international prestige by pushing his economic development program harder than ever. Whether this would involve still further demonstrations against private enterprise is one of the things worrying businessmen.

Until July's nationalization sweep, there was still hope in Western quarters that Nasser would leave a significant role open for private enterprise and foreign investors in his industrialization plans. They were encouraged by the statements of top U.A.R. officials that only by working as partners could the public and private sectors raise living standards.

Last June the government banned imports by all except about a dozen specified government-owned companies and a few industrial companies that would be permitted to import for manufacturing but not for sale.

But the real blow came in July. All banks and insurance companies and 149 industries "of a national character" were nationalized outright. Included were sales companies, cement, metallurgical and timber producers, land and investment companies, and the Abu Zaabal and Kafr El-Zayat Fertilizers and Chemicals Co.

The government declared it would take at least 50% ownership in another 91 companies. This covered most construction and contracting, and cotton ginning firms, consumer goods industries, locally owned pharmaceutical companies and department stores. It also affected foreign investments in local shareholding companies—subsidiaries of Shell and British Petroleum, Philips Lamp, and Siemens.

And, in a move that cleaned out most of the chemical industry, the government decreed that, in the case of 159 companies, it would take over individual or company holdings in excess of $28,000. This gives the government up to an 80% share in many of these companies. It affects Caltex's 14% share in an Alexandria refinery, and most chemical firms, rubber, pulp and paper, fertilizer, drug, and plastics producers, engineering

firms, the entire textile industry, etc.

Shareholders in these nationalized or partly nationalized companies are to receive government bonds in return for their holdings.

In addition to these takeovers, the government limited the remuneration of any company chairman or director to about $15,000/year, including all allowances; ordered at least two representatives of "staff and labor" to be on the board of directors, with the total membership limited to seven; and decreed that 25% of profits should be distributed to all employees, 10% in direct payment and 15% in fringe social benefits. It also made major changes in the income tax setup and land reform.

Restrained Welcome: Despite all these moves government officials still maintain that private foreign investment is desired. They assert that the nationalizations were aimed at basic industries, "monopolies," nonproducing middlemen who had a grip on the market, producers of important materials (e.g., cement and timber), which are given a special place because of Egypt's building program, and "special cases" where for one reason or another the government felt there were abuses.

Government spokesmen insist that this is the final list of companies to be taken over. They say that Egypt's socialism is not the "Western" ideological variety, that it is pragmatically formulated out of the conviction that private enterprise left to itself failed to produce satisfactory economic growth. There is still room for the profit motive, they say, although they also maintain that "social interest," not "profit maximization," will rule investment and price decisions from now on.

Nasser has set down a priority list of the kinds of investment he wants in the U.A.R.: (1) state capital, (2) foreign government credits and loans to the U.A.R. government, (3) private local capital, (4) foreign capital—in certain cases.

Government representatives say they welcome foreign participation in essential industries where local know-how is needed—e.g., synthetic fibers and pharmaceuticals. Since the government will generally insist on 50% government ownership in essential industries, this means that foreign investors have to be willing to put their money into companies run by the government.

Underscoring this "welcome" for foreign investment, a government spokesman in New York says that Egypt plans to send a mission to the U.S. seeking private investment, similar to the one that toured Europe a few months ago.

Its reception will doubtless be less than enthusiastic. Despite the government's assertion that it nationalized only "special cases," the fact is that the nationalization decrees made the state the majority stockholder in all but 700 minor firms, which largely reduced the role of private enterprise to running cottage industries and specialized retail shops.

Sitting Tight: But some companies find themselves a part of Nasser's economic scheme whether they like it or not. Case in point: the foreign pharmaceutical companies. Pfizer, Farbwerke Hoechst and Swiss Pharma (Roche, Sandoz and Wander) each have 60% interest in three small ventures with private Egyptian partners.

Pfizer-Egypt will begin production (primarily of antibiotics) in December or January in a small compounding and packaging plant at Heliopolis (a suburb of Cairo), with production valued at an estimated $1.5-2 million/year. Swiss Pharma will start production in about a year, in about the same volume, Hoechst in about six months, producing 30-40% less.

A year ago the U.A.R. nationalized imports and sales of pharmaceuticals. This means that Pfizer and the other foreign drug companies with plants in Egypt will sell the bulk imports to the government, which will then sell them to local subsidiaries for processing, then buy back the finished products for distribution. What kind of profits this arrangement will yield the companies remains to be seen. "So far," one company official says, "the government has been fair enough in its dealings with us. But how long this will last, no one knows."

The best security these drug firms (and any other company bold enough to venture into Egypt) have is their know-how and their labels. The government wants to build export markets, and knows that labels with an international reputation will help their sales.

Surprise Bonus: Somewhat to their surprise, U.S. pharmaceutical companies have found that they can get along very nicely with the government's nationalized import scheme. The government's motive in taking over the drug imports was to cut costs. It wanted the power to choose the lowest-price supplier, to reduce wasteful duplication of products sold under different labels. Formerly about a dozen firms imported drugs. Now one government company—the General Pharmaceutical Organization—handles the imports of all drugs. And instead of the multitude of importers in other lines, there are now a total of just 13.

But there are complaints about the system. Delays are reported in getting raw materials, which under the previous setup had been procured by enterprising private agents with long contacts abroad. Government employees, one hears, couldn't care less. One of the international drug firms now building a plant in Egypt reports it has been waiting since February to get a raw-material order processed.

Egyptian officials maintain that private importers didn't get as good a deal as one large (government) importer can get. They also say the importers took too much profit, charged exorbitant prices, and smuggled money out of the country. But critics reply that whatever advantages the government gains will be lost through inefficiency.

Nevertheless, even though the government took over drug imports and sales and slashed retail prices 25%, a U.S. drug company (which insists on being unnamed) tells CHEMICAL WEEK that its business with Egypt has never been better. This company attributes its success to its continued active promotion of its products even after the government took over sales, and to the fact that the government has weeded out a lot of smaller suppliers, giving the U.S. company a greater proportion of total sales.

Two years ago this company applied for government permission to put up a plant in Egypt, but still hasn't received it. Since then, the nationalization moves have made the investment picture less inviting, especially with exports doing so well. Says a company spokesman: "We haven't withdrawn our plant application, and the initiative still rests with the government. But we're not exactly beating on any doors to get it through."

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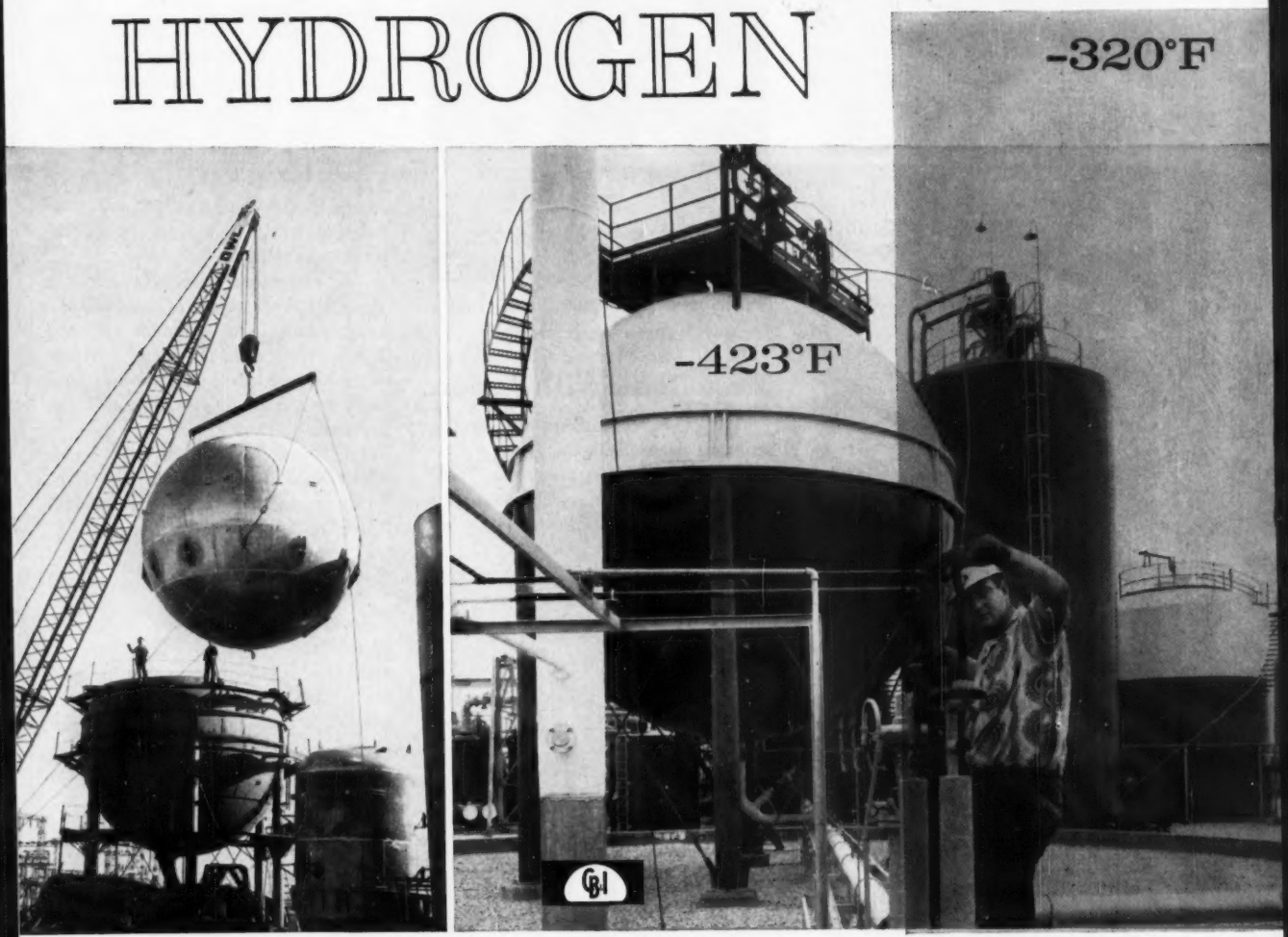
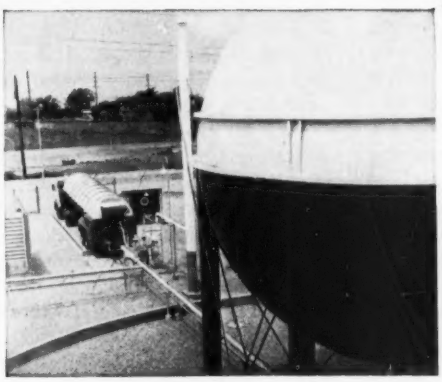


These double-wall cryogenic storage tanks play a vital role in the first privately-owned plant to supply liquid hydrogen on a large-scale commercial basis. Hydrogen is stored in the sphere at –423°F and nitrogen in the cylindrical tank at –320°F. Located in Torrance, Calif. and owned by Linde Company, Division of Union Carbide Corporation, the plant will deliver 3,300,000 lbs. of liquid hydrogen yearly to missile centers. Both tanks were designed (using Linde-approved designs), fabricated and erected by CB&I, world's most experienced builder of cryogenic vessels.



ABOVE: Aluminum inner shells and carbon steel outer shells were used for the two cryogenic tanks. The spherical tank is 28 ft. in diameter and the cylindrical tank 21½ ft. Special insulation is between the shells.

TOP LEFT: The inner sphere is suspended in the outer sphere by stainless steel rods positioned around the perimeter. Resting on the ground nearby is the aluminum inner shell of the cylindrical nitrogen tank.

LEFT: A trailer is being loaded with liquid hydrogen for delivery to missile centers, other government installations, or industry.

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EEC Talks Start

Britain has started off on the right foot in its formal approach to enter the European Common Market.

At a meeting in Paris last week with the foreign ministers of the six Common Market countries, Edward Heath, Britain's chief negotiator, stated that Britain "shares the objectives" of the European Economic Community, including both the economic program set forth in the Treaty of Rome and the aims of the July agreement for a system of political consultations between the member states' heads of government.

This reportedly pleased the Common Market ministers, some of whom had feared Britain did not subscribe to the group's aim of close political cooperation. Actually, since these political aims of the Common Market have never been worked out in detail or really agreed upon by the present members, Heath wasn't committing Britain to very much—politically.

Still to be solved are three concrete problems concerned with Britain's trade commitments to the Commonwealth and to its partners in the Free Trade Assn., and harmonizing its agricultural policy with EEC's. Heath said Britain believes these can be handled by amendments to the treaty, instead of by changing the treaty itself.

This meeting was called to discuss procedural questions. The first round of detailed negotiations will be held Nov. 8-9.

Squeeze on Hoechst

The squeeze on West German chemical profits is pointed up by Farbwerke Hoechst's nine-month report.

Because of a 4% price cut, value of the firm's sales during the first nine months of this year rose only about 7% over the corresponding period in '60, even though volume was up almost 11%.

Hoechst expects to maintain this 7% increase during the year, with profits held down to the '60 level. The price declines reportedly will cost Hoechst about $30 million, while only about $3 million will be saved on raw-materials.

Price pressure has been fiercest in plastics, solvents and aliphatic semi-finished products.

Goodyear's De Young, and Toyo's Taniguchi agree on licensing.

More Deals with Japan

More U.S. companies are signing licensing deals in Japan.

Eastman Kodak's Tennessee Eastman Co. division has agreed to supply Showa Denko (Tokyo) its polypropylene process under a license, if the Japanese government approves. Goodyear's President Russell De Young and Toyo President T. Taniguchi disclosed the deal last week.

This would be the second U.S. polypropylene license with a Japanese company. AviSun has licensed Shin Nippon Shisso.

Eastman's Showa Denko license will cover a different process from the one being used at Kodak's Texas Eastman plant at Longview, Tex. This one, "recently developed" by Tennessee Eastman at Kingsport, produces a stereosymmetric polymer, which Eastman says differs from other polypropylenes in its polymeric configuration and crystallizability. It's expected to find a "wide variety of applications in molded and extruded products and in sheetings and fibers."

First for Goodyear: Goodyear Tire & Rubber Co. is making its first foreign tie-up for Vitel polyester fiber resin production with a Japanese company. Under a 10-year pact, it will license Toyo Spinning Co. (Osaka) to use its technical know-how for the design, construction and startup of a 10-million-lbs./year plant at Iwakuni, about 25 miles from Hiroshima. This deal is also subject to approval by the Japanese government.

Von Kohorn International Corp. (White Plains, N.Y.) has entered into a machinery and technical assistance agreement with Nippon Rayon (Osaka). The Japanese company will build a pilot plant to evaluate Von Kohorn developments in stabilized nylon-6 tire yarn.

Meanwhile, some technology is moving in the opposite direction. American Cyanamid has signed a contract with Toyama Chemical providing Cyanamid with technology for Toyama's Panfuran and the exclusive right to produce and sell it outside Japan, Taiwan and South Korea. Panfuran is a tradename for two nitrofuran compounds.

The drugs are reportedly effective against a wide range of bacterial diseases, especially staphylococci and dysentery bacteria that have developed resistance to conventional antibiotics. Cyanamid is now testing the product.

The 10-year contract calls for a 5% royalty on total sales of Panfuran and any derivatives developed from the Toyama process.

BRIEFS

Profits/Japan: Japanese industrial profits are beginning to show a squeeze that's evident in Europe and the U.S. A government survey shows sales of manufacturing companies up 11.1% in the second half of fiscal '60 (Oct. to March '61), while profits rose only 9.4%, compared with the second half of fiscal '59. The profit-to-capital ratio for these companies slipped from 6.6% to 6.4%.

•

Polyethylene/Pakistan: More details on the German polyethylene plant for Pakistan: Salzgitter Industriebau and Braunschweigischen Maschinenbauanstalt will supply and build for Manzoor Chemical and General Industries (Karachi) plants to extract alcohol from molasses, convert it into ethylene, produce low-density polyethylene, and process the resin into final products. Annual production: 5,000-6,000 tons/year of resin. The $11-million project is due onstream by late '63.

•

Carbide/Austria: Donau Chemie expects to boost carbide output at its Landeck plant to 33,000 metric tons, a 75% increase over '58. Unused capacity will allow further increases.

BRIEFS

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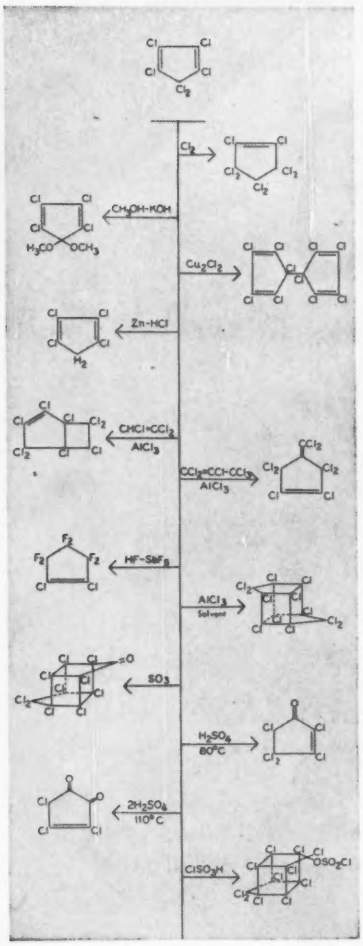

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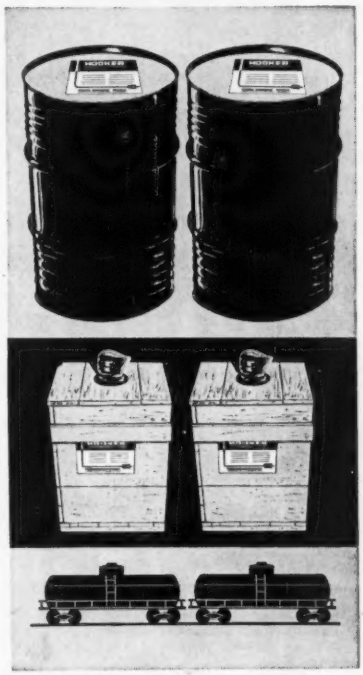

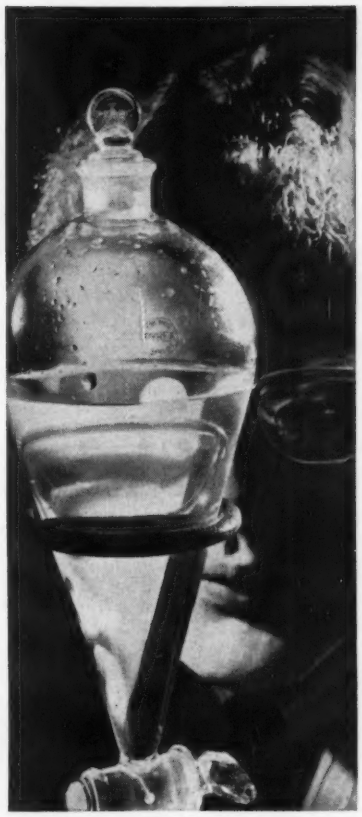

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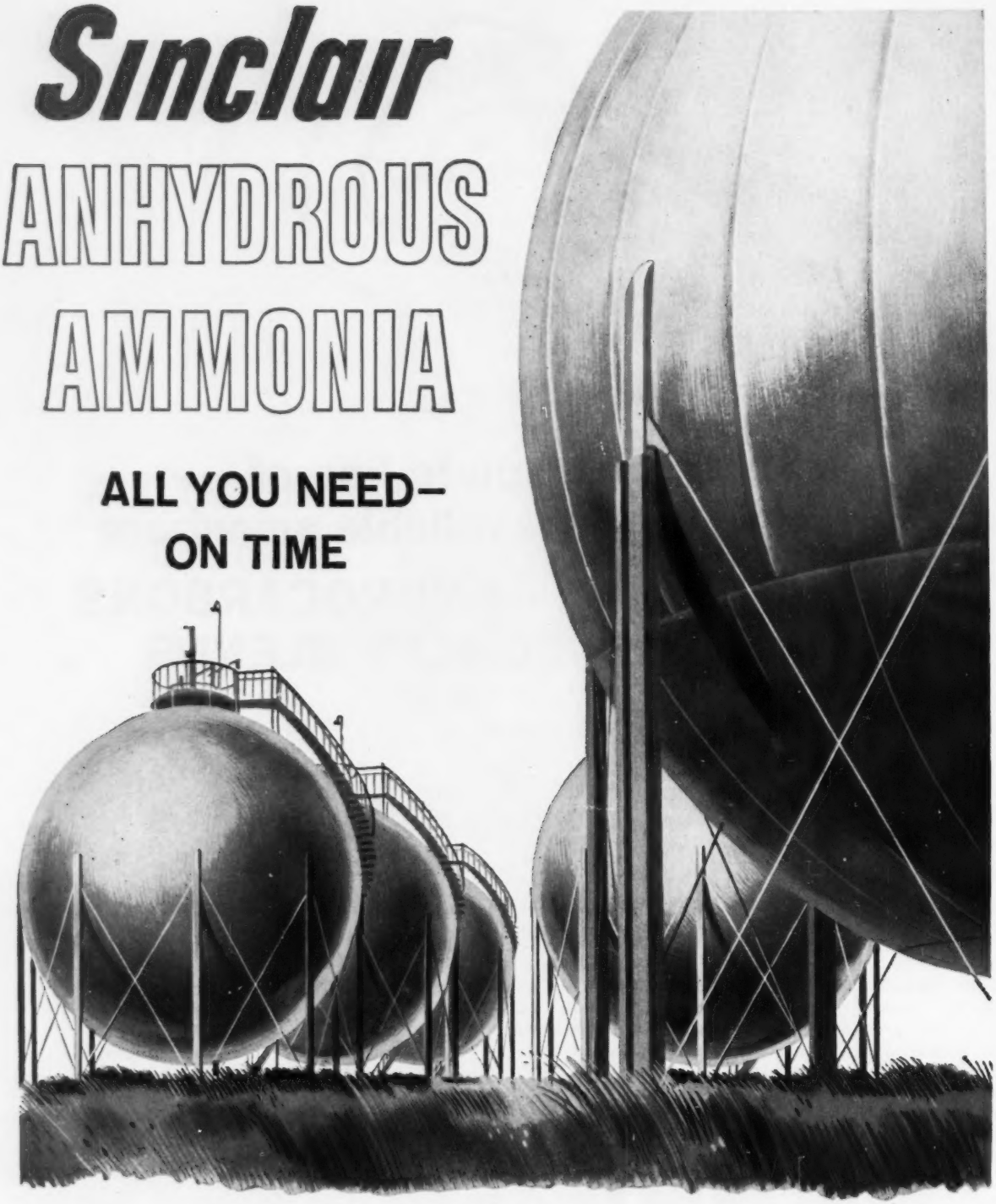

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Putting Drugmakers Over a New Barrel

Pharmaceutical makers got a harsh new jolt last week. The largest independent distributor of drugs in the U.S., McKesson & Robbins, Inc., suddenly disclosed it was going to make and sell—under generic names and at cut prices—many of the high markup prescription drugs usually sold under tradenames.

M & R President Herman Nolen dropped his bombshell in a prepared talk to New York financial men. His company, which claims to handle about 27% of the retail drug volume in the U.S., is the only nationwide distributor of pharmaceuticals; it sells products made by other companies to about 38,000 drugstores (roughly 70% of the U.S. total). It makes a few items itself, and sells still more under its own label—mostly proprietaries. But now it is expanding its drug manufacturing operation and will push prescription items. Nolen made it clear later that the corticosteroid arthritic drugs are included in his plans.

Over the Barrel: Reaction was bitter from drug industry management men, already wearied by attacks from the Kefauver Committee and Health, Education & Welfare Secretary Abraham Ribicoff and tried by a feud between retail drug associations. But most of the bitterness, poured out to CHEMICAL WEEK reporters across the nation was "off the record." Reason: the drugmakers are over a barrel—they can't move products to enough drugstores without M & R's help.

The head of one large Midwestern drug house, for example, is "hopping mad about it." He calls it a "big explosive issue," goes on to say, "It places us in the position of evaluating such wholesalers and what they now mean to us. We have to ask ourselves how long they can manufacture drugs in competition with us and keep our business. We feel this is a nefarious activity and contrary to the basic job of distributing our drugs.

"We must be able to rely on our wholesalers; therefore, I don't see how any sensible, sane person can conclude that we'll continue to work with them in any way." He went on to talk about coming changes in pharmaceutical distribution patterns, hinting that his company may no longer rely heavily on wholesale distributors such as McKesson & Robbins.

On Its Own? Industry sources say (though the company denies it) that Eli Lilly may be on the point of dropping its franchise with McKesson & Robbins, setting up its own distribution network. Lilly now sells about $300 million worth of drugs yearly through M & R. The drug house began putting pressure on M & R recently by reducing its discount schedule about 3% across the board.

Most manufacturers don't see a trend toward generic drugs, believe it would require too large a change in the prescription habits of doctors. Further, they are vehemently opposed to the idea, say "about the only way you can make a profit in the generic field is to ride on someone else's research."

Several states, including California, Pennsylvania, Connecticut, and Ohio, have laws setting ceilings on the amount people on old-age relief can spend on drugs. This naturally draws generic-name drug manufacturing and cut rates—the intention of the laws. The ceilings can be quite drastic. For example, in California, prednisone has a ceiling of $4/100 five-milligram tablets; at the same time one popular brand-named product sells for $17.90 wholesale, about $30 retail.

The idea of a distributor making its own drugs is not new—a local distributor, Los Angeles Drug Co., for example, has for over five years sold generic-named drugs it makes itself. It's a new thing to have a company of the size of McKesson & Robbins get into it.

M & R President Nolen concedes that he can get away with a bit because his company is, indeed, indispensable to the industry at present. But he says he discussed the move with many major suppliers beforehand, obtained approval of sorts. His argument was that changing patterns in drug buying—through government action, Kefauver-generated publicity, and health insurance plans—made it

Senator Kefauver: He spurred interest in generic names and prices.

HEW's Ribicoff: He's ready to help push through new drug selling rules.

M & R's Nolen: He'll be waiting with generic drugs to cover all bases.

absolutely necessary that M&R be able to supply its customers with this kind of drugs.

Nolen says he would happily buy such low-cost generic drugs from a regular M&R supplier if they were available, but that the big pharmaceutical houses haven't been able to meet his price needs. Reason: they have too much fixed overhead—e.g., research and promotion expenses.

No Research: M&R itself plans to do no research, send out no detail men to contact doctors. It will keep promotion of all kinds at a minimum (primarily via advertisements in professional journals) keep ad expenses at a maximum of 5% of sales. Products will be public-domain items, perhaps augmented later with others made under low-cost license deals.

Nolen counts heavily on "maintenance drugs"—e.g., those used by arthritic victims in certain quantities month after month. This type of drug buyer, he believes, will shop for the best buy, no matter how the doctor writes the prescription. McKesson is in a good position to win this customer—through its close contact with pharmacists. First step is to convince the druggist that the McKesson product is as good as the tradenamed item, although perhaps one-fifth the price. He would tell his regular customers, who would go back to their doctors, demand a generic-name prescription.

Top Quality Guarantee: McKesson feels that a big part of its job will be to convince doctors and patients that quality has not been sacrificed to price. It is planning to keep 20% of its production personnel in quality control—more, it says, than any other pharmaceutical manufacturer does.

The McKesson name will be prominent on each drug package. The product itself will be called by its simplest available generic name ("cough syrup," "penicillin"). Similar packages will be used on a variety of proprietary and toiletry products such as after-shave lotion. These will be advertised, will do much, Nolen feels, to get the brandname across to consumers.

Super Service: M&R's strength lies in the way it has long courted the nation's retail pharmacies and in the efficiencies of its refined distribution methods. Many of the country's largest drug chains, which might be expected to handle their own distribution, instead rely on M&R. Reason: it's not as expensive. Another reason, less often mentioned, is that it keeps the chain stores a reassuring arms-length away from the Teamsters Union. Many drug companies apparently feel that once they begin dealing directly with James Hoffa's union, their whole company, including the retail clerks will be open to Teamsters' overtures. With McKesson & Robbins dealing with the union, a strike wouldn't necessarily cripple the whole chain.

M&R performs many other services for its drugstore customers, ranging from designing stores to financing them. It makes perhaps its biggest point with frequent deliveries, averaging two a day. But it will make as many as 10 daily in some localities. This means that druggists need carry only a minimum inventory.

Still, big as it is, McKesson & Robbins is far from being the nation's only drug distributor and faces sharp competition in every community it serves. Industry observers, many of whom are puzzled by M&R's move, speculate that the company may be primarily interested in getting "one up" on its rivals. Others speculate that M&R foresees that some pharmaceutical legislation may get through Congress and wants to be firmly in position for a coming generic-name drug sales scramble.

Broad Picture: McKesson's move comes at a time when the pressure from Washington is off the drugmakers. But drug producers see some fairly grim legislative matters pending. Most important is Senator Estes Kefauver's (D., Tenn.) drug bill, now before Chairman Kefauver's Senate Antitrust and Monopoly Subcommittee, which doubtless will present the bill to the Jan. '62 Congress.

Sponsors claim the basic effect of the legislation would be to stimulate competition, thus drive down drug prices. The bill has two points:

(1) Direct economic regulation. It would amend the Sherman Antitrust Act to bar agreements or conspiracies among drugmakers on patents and patent licensing for prescription drugs. The law would also make modifications or combinations of prescription drugs nonpatentable unless a significant increase in therapeutic effect could be shown. Further, it would require holders of prescription drug patents to license manufacture of their patented drugs to all comers after three years, instead of after 17 years, as is now the case.

It is the possibility of this point becoming law that many industry men believe has inspired McKesson & Robbins' move. At the moment, there are not many high profit drugs that aren't covered by patents. And unless patent holders are forced by law to license, firms such as M&R probably won't get to make their products, according to industry opinion. But the law might be passed—though odds are against it—and that would put McKesson in a good position.

(2) The government's second approach would come through amendments to the Federal Food, Drug and Cosmetic Act. These would strengthen and extend regulatory control to assure quality and reliability of drugs, especially new ones. Other provisions would set up federal procedures for establishing generic names for drugs (HEW Secretary Ribicoff emphatically wants this) and increase the flow of information about risks and limitations of prescriptions to physicians.

Time for a Hearing: Kefauver's subcommittee this week will hold further hearings on the patent provisions of the bill. These provisions, the most controversial, are given least likelihood of passage by people in the industry, which almost uniformly opposes it.

It is difficult to guess the outcome of any piece of legislation, particularly one that hits as many sore points of the industry as this one does. But it is possible to guess Kefauver's strategy: He is much more interested in the parts of the bill that provide tougher federal regulation of drugmakers than in the patent laws. He would let patent provisions be stripped from the bill to get the two regulatory points.

Mail-Order Muddle: At the same time, various authorities and retail pharmacists' groups have become concerned about mail-order prescriptions. California's State Pharmacy Board now demands that, among other requirements, mail-order druggists register with the state. The Food & Drug Administration has been approached by worried retail pharmacists urging that FDA set up similar regulations, but so far FDA seems reluctant to act in this matter.

Internecine Strife: Adding to drug marketers' uneasiness was a recent feud between the two leading retail

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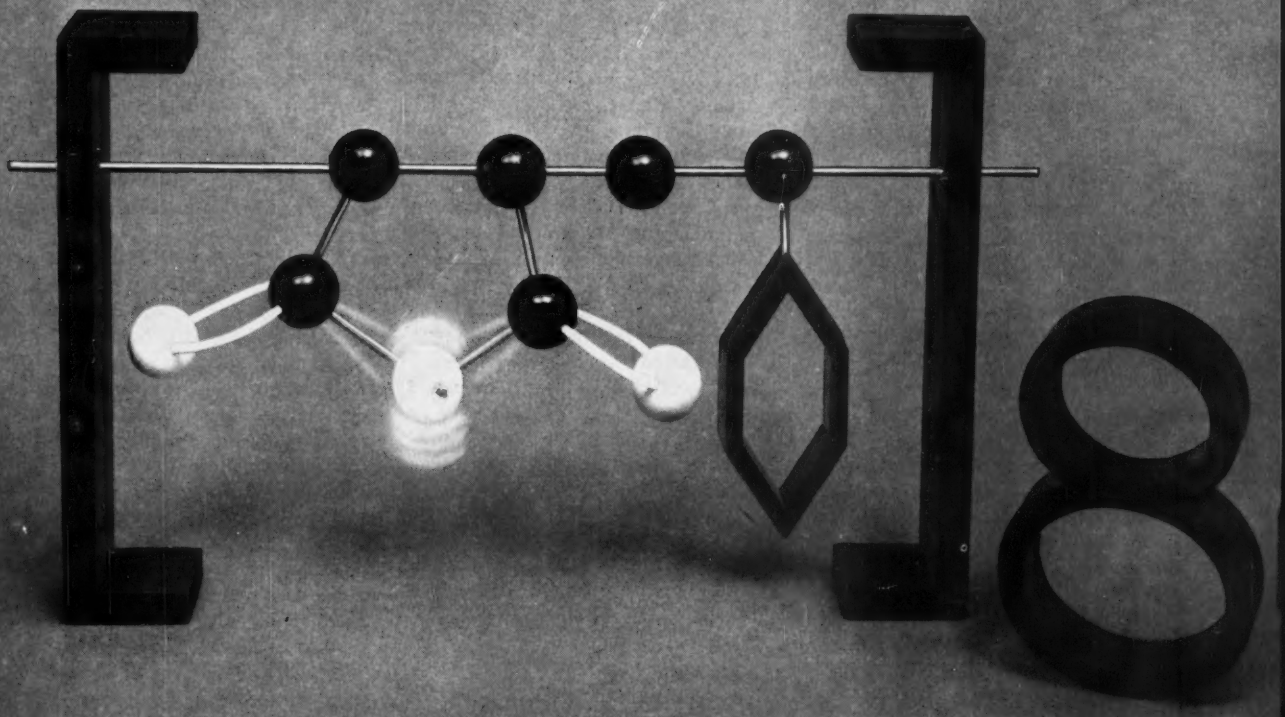

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druggists' associations: National Assn. of Retail Druggists and American Pharmaceutical Assn. The dispute has quieted for the moment due to the death last week of one of the protagonists, John Dargavel, head of NARD.

The controversy revolved principally around the handling of a state price-fixing action against Northern California Pharmaceutical Assn. The California Pharmacists lost the case (which involved mainly their use of price lists), and Dargavel accused APA, which handled the case, of bungling it. A further point of contention was the question of the professionalism of pharmacists (which would justify calling the markup a "professional fee," putting it out of the reach of price-fixing watchers). APA supported this approach, while NARD thought emphasis on straight selling techniques was more important.

It is sensible that a firm selling to drugstores, as McKesson & Robbins does, would vocally support all trade and professional organizations. That's why M&R quite possibly has been more concerned about its customers than about any possible complications with its suppliers.

Changing Strategy: The whole industry is uneasy about selling strategy right now, however, and for a variety of reasons. The marketing picture is changing faster than most firms can keep up with, and toward unknown directions. Complicating the situation are such developments as Sears, Roebuck's setting up a chain of drugstores and Woolworth's similar plans. And still another big retail organization, Spiegel, is offering its credit customers a nonprofit prescription filling service.

Further, new laws are in prospect, new public attitudes toward the industry are forming. For these reasons a firm like McKesson & Robbins would want to try something new, hope to hold its position—perhaps gain a little. Time—possibly a fairly short time—will tell whether M&R tried the right thing.

DATA DIGEST

• **Packagers:** The Packaging Institute (342 Madison Ave., New York 17) has published the fourth edition of its "directory of Contract Packagers and Their Facilities." The new directory has 593 listings, includes packagers in the U.S., Canada, Mexico, Australia, England, Japan, Germany, Sweden.

• **Resins:** A brochure describing nine hydrocarbon resin emulsion products has been published by Pennsylvania Industrial Chemical Corp. (Clairton, Pa.). The types described include anionic, cationic and nonionic emulsions. The brochure also describes their uses with natural and synthetic rubber latexes and polyvinyl acetate.

• **Copolymer:** A 40-page data bulletin on Gantrez AN, a new water-soluble copolymer, is available from General Aniline & Firm Corp. (435 Hudson St., New York 14). The booklet describes the material's physical, chemical and physiological properties, gives applications in 19 industrial fields.

• **Ion Exchange:** A booklet published by Bio-Rad Laboratories (32nd & Griffin Ave., Richmond, Calif.) describes a group of analytical-grade ion-exchange resins. They include anion, cation, mixed-bed and other resins. The booklet gives technical data, prices, tradename cross references, and a bibliography of articles in the field.

• **Alcohol:** A chart showing all the approved uses of each type of denatured alcohol formula is available from Industrial Chemicals Dept. of Commercial Solvents Corp. (260 Madison Ave., New York 16). The chart has been revised to show laws as they now stand.

• **Sodium Lauryl Sulfate:** Physical and chemical properties of products in the Maprofix HM line of powdered sodium lauryl sulfate are described in a new bulletin issued by Onyx Chemical Corp. (190 Warren St., Jersey City 2, N.J.).

• **Ethylene:** Booklet outlines all major chemical reactions of the ethylene molecule and gives bibliographical references for further investigation of ethylene's double-bond reactions. Graphs and tables detail physical properties. U.S. Industrial Chemicals Co. (99 Park Ave., New York 16).

• **Plastics:** Booklet highlights company's plastic products, such as fire-retardant rigid foams, thermosetting molding compounds and bonding and coating resins. Brief description of uses is backed up with charts listing physical properties. Durez Plastics Division, Hooker Chemical Corp. (8 Walck Rd., North Tonawanda, N.Y.).

Canadian Wrap-up

Canada's packaging film industry is shifting into high gear. Among the latest developments:

• Union Carbide of Canada's Visking Division is about to start production of polypropylene film. The company is already Canada's largest producer of polyethylene film, has three plants operating (Lindsay, Ont.; Winnipeg, Man.; Cowansville, Que.) and is now building another near Vancouver, B.C.

• Dow Chemical's (Sarnia, Ont.) purchase of Bradshaw's, Ltd., Canada's major converting firm in the packaging field, has bolstered hints that it might extend its operations from resin supplier to extruder. Dow lacks a basic position in low-density polyethylene, has found it difficult to break Carbide's and Du Pont's hold on the PE film market. However, Dow is now making linear PE at Sarnia, will probably be the first Canadian producer of polypropylene. Current expectations are that the company will be able to start polypropylene production in about one year.

• Du Pont is still pushing its cellophane but plans to double the size of its Whitby, Ont., polyethylene plant by the end of this year. Du Pont recently made a deal with Union Carbide (*CW Market Newsletter, July 29*) whereby the two firms exchange resins to fill out each other's lines.

• TCF of Canada (Cornwall, Ont.), like Du Pont, will supplement its cellophane output by producing polyethylene and polypropylene packaging films. Along with parent Courtaulds (Canada), TCF now has an arrangement with AviSun to distribute PP film (*CW Market Newsletter, Sept. 16*). TCF feels it is necessary to retention of its bread-wrap business.

• Canadian Industries Ltd. has a working agreement with the Kordite Division of National Distillers, and can be expected thereby to soon complement its polyethylene film with polypropylene film.

Generally, plastic films seem to be moving rapidly in Canada as in the U.S.—but the competitive picture may turn out differently. One sign may be the recent government-initiated price-fixing action against a group of five of the country's leading plastic film makers.

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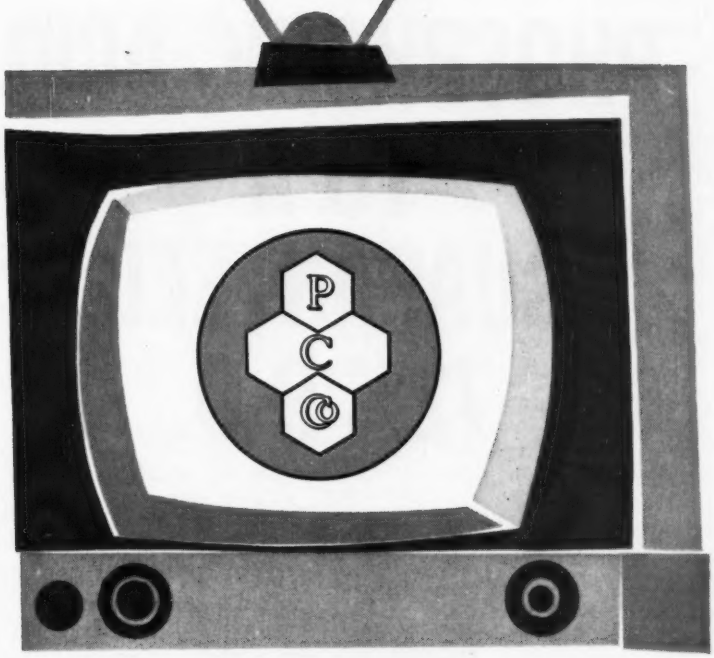

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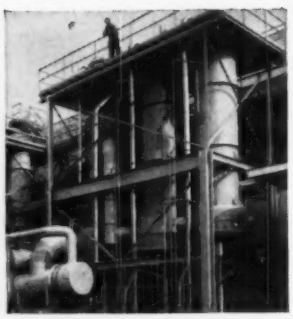

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Washington Newsletter

CHEMICAL WEEK
October 21, 1961

The way is open for liberal tax depreciation allowances for chemical processors and other industries. This is the interpretation placed by White House and Treasury Dept. officials on President Kennedy's directive last week permitting faster tax write-offs on production equipment in the textile industry. Similar decisions will be made for other industries during the months ahead—and the chemical process industries are definitely among those under consideration.

The basic plan: textile companies will be allowed to deduct more each year from their tax returns as depreciation allowances, saving them an estimated $25 million/year. Many items of textile equipment that had to be written off over periods of 25 or 40 years now can be written off in 15 years. Finishing equipment, which generally was amortized over 15-20 years, now can be written off in 12 years. The ruling applies mostly to new purchases. But the Administration says it expects to make tax adjustments on the remaining useful lives of equipment now in use.

Administration officials agree that the decision is a breakthrough for more liberal depreciation allowances, which industry has sought for years. President Kennedy has approved a changed basis for calculating the tax life of a piece of capital goods. He has, in effect, agreed with many industry tax experts who assert that a piece of equipment may become obsolete and have to be scrapped long before it falls apart. The effect, of course, will be to provide textile companies with more cash to modernize production lines and compete with foreign products.

•

Manufacturers expect higher sales and inventories in the fourth quarter of this year, according to a Commerce Dept. survey. If expectations are realized, fourth-quarter sales will total $96 billion on a seasonally adjusted basis, up 5% from second-quarter sales of $92 billion. Inventory book values are expected to rise from $53.4 billion on June 30 to $55.7 billion at year's end. Commerce gives no industry-by-industry breakdown but does say (1) that virtually every industry expects to participate in the gains and (2) that durable goods industries anticipate more of a rise than do soft goods industries.

•

A $150-million aluminum plant in Argentina is the goal of negotiations being conducted between Kaiser Aluminum and the Argentine government. The plant would be part of Argentina's regional development plan under the Kennedy Administration's Alliance for Progress program. Argentina wants at least $200 million in direct U.S. aid over a six-to-eight-year period for a system of hydroelectric projects in the interior of the country. Prime users of the new power would be the aluminum plant and a $100-million plant for direct-reduction of steel; the latter is being planned by European business leaders. Administration officials say

Washington Newsletter

(Continued)

the U.S. will await completion of feasibility studies next year before deciding how much money, if any, it will give to Argentina. Unofficially, President Kennedy has assured Argentina of some U.S. help.

•

Federal subsidies for the private nuclear industry will get a thorough review in Congress next year. The Congressional Joint Committee on Atomic Energy plans a complete examination of the effectiveness of direct and indirect federal subsidies as a stimulant to the private nuclear industry. It will involve both power reactor operators and reactor equipment manufacturers.

There is more to the study than meets the eye. Rep. Chet Holifield (D., Calif.), committee chairman, and Sen. Clinton Anderson (D., N.M.), former chairman, still are annoyed with private industry for sidetracking the Hanford, Wash., nuclear power project. Speculation is that next year's study will recommend that federal financial grants to industry (under the so-called partnership approach) be ended and that a government reactor construction program take its place.

•

A production license for Type-3 oral polio vaccine still is some months off. So says Surgeon General Luther Terry. He made the statement last week as the U.S. Public Health Service licensed an English subsidiary of Chas. Pfizer & Co. to produce Type-2 oral vaccine. Pfizer earlier won a marketing-production license for Type-1 oral vaccine. The preponderance of polio in this country is of Type-1 or Type-3 variety. The government is recommending continued use of Salk vaccine pending production of a Type-3 vaccine.

•

Another state "fair trade" law has been upheld by the Supreme Court. This is the effect, at least, of the court's refusal last week to accept an appeal involving Virginia's fair-trade statute. The state's courts had declared it constitutional. It has been 10 years since the Supreme Court has reviewed a state fair-trade law—in effect upholding every law brought to it on appeal.

At issue in the Virginia law is an unusual clause that provides that simply by accepting fair-traded goods and a price list for them the retailer is committed to abide by fair-trade prices. A drugstore chain claimed this is unconstitutional. But state courts agreed with proponents of the law that if a retailer does not want to sell fair-traded goods he is free to trade in items that are not fair-traded.

•

Administration pressure to hold down wage increases is causing considerable concern among AFL-CIO leaders. They've come to the belief that the Administration is in earnest and will do all it can to hold down wages—as well as prices. James Tobin of President Kennedy's Council of Economic Advisors recently told about 50 AFL-CIO economists that wage increases should be held to productivity gains. He also asked them to do away with escalator clauses on the ground that they help feed inflation.

ONE OF A SERIES OF CHATS ABOUT THE CONSERVATION AND CONTROL OF HEAT

SARCO TOPICS

WHY THE BIG STRAIN?

It's tough to keep gases and liquids "clean" as they run through a pipe. They drag impurities along, which can make even plain water a trouble maker, let alone more sophisticated fluids. That's because water, as a liquid or steam, is intimately involved with vital equipment like steam traps, temperature regulators, or tools. Meters, burners, nozzles, and pumps, too.

By this time you must realize we're going to talk strainers, don't you? A good, stout subject, of interest to all who feel production belongs up and costs belong down. Sarco makes strainers for water and condensate, steam, oil, air, gas and other piped fluids . . . dozens of different sizes and types and ratings of strainers to match every application need. Even our line of plain and simple strainers is built for super service. These are pipeline strainers, types AT, BT, and CT, which are designed for 250, 250 and 600 psi non shock, respectively, and 475°, 450° and 750°F. temperature ratings. Standard screens are heavy-gauge, perforated brass or stainless steel. Sarco specializes in screens that can withstand abnormal pressure differentials created by accumulated sediment.

Next, Sarco's flanged strainers, type D These come in larger sizes, right up to 12", and are available in standard or extra heavy types.

And finally, *Sarco scraper strainers*, manual or motorized. These are the really eye-popping models, and if you can't use one yourself — well — you'll just have to get your kicks elsewhere.

Examples? Take Inland Steel Company at East Chicago, which gets water from Lake Michigan to cool its large air conditioner condensers. The water used to pass through traveling screens, but still contained fine sand. Clogging!

Heat under collars! Frequent cleaning required! Sometimes practically no air conditioning on hot days. (Isn't that always the way?)

The Inland Steel people installed Sarco Rotary Scraper Strainers, Type VRS, which incorporate a hand-operated helical scraper knife within the cylindrical strainer screen. A few turns of the crank at regular intervals, and the sand is scraped off the screen, blown clear, and discharged at pressure through a manual valve to waste. Dismantle the strainer? Shut down the unit? Not *this* strainer!

Now, as long as we've come this far, it's only a hop and a skip to the Firestone Tire and Rubber Co. in Akron, Ohio, who also use water in tremendous quantities. They circulate it through tire presses and a cooling tower, and there's no nonsense about it. It *has* to be clean or damage to equipment could be downright catastrophic. When the plant

modernized and enlarged, Firestone replaced their 4" Sarco hand-operated scraper strainer, type VRS, with a larger Sarco 8" model. And while they were about it, they got the motor-operated type, for continuous cleaning.

When we say that companies like these want the insurance of a Sarco strainer, it sounds like advertisingese, but sometimes there just isn't any other way to put it. Sarco strainers *are* insurance at low cost on the operation of your high cost equipment. So when we ask if you have lumps in your pumps, or worries over your slurries, we're *serious*. We've heard everything in the straining line, so why not write us for literature and answers to those special problems you have.

A T-44 IS THE BEST POLICY

Sorry, but we can't leave the subject of insurance without bringing to your attention one of the best little insurance policies any company requiring cooling control could invest in. It's the *self-powered* Sarco T-44 Automatic Cooling Control. No compressed air or electricity is needed, but its advantages are best described in terms of three different plants of just one Sarco customer — Revere Copper and Brass, Inc.

Revere-Baltimore, Md., has cut water use 40 to 50% with T-44's. But in addition to former water waste, Revere had even more problems: possible wet air from uncontrolled cooling of compressor aftercoolers, plus sweating compressor cylinders; variations in viscosity of hydraulic oil and bearing oil; gas generator water waste; unreliability of manual shut-off of water supply when machines were down.

If your ears perk up in sympathy at mention of any of these problems, the results of Revere's cooling control program should bring you to full attention. One large compressor that had gulped 2400 gallons per hour now takes only 420 gallon sips. In addition all the problems itemized above were solved. T-44's are now used on their air compressors, gas generators, and hydraulic oil systems. At Revere-Riverside, Cal., water savings of 50% were experienced, and at Revere-Rome, N.Y., substantial savings were made too.

But after all, wasting water is only one way of wasting money, so let's go on to another matter of interest: the evils of manual control. When cooling water is controlled by hand the temptation to leave the valve nearly wide open is almost overpowering, in order to play it safe if the load varies. Result: overcooling, of course. And varying the flow runs the risk of undercooling. In either case, lowered process efficiency. Answer: The automatic Sarco T-44, which can't be tempted, is meticulously honest, unsentimental, and plain inhumanly practical when it comes to cooling control. You really ought to write for literature. T-44 is your best policy.

SPARE PARTS INSURANCE

As long as we're near the end, and still on this subject of insurance, may we graciously leave you with this valuable tip? No matter how closely a steam trap approaches perfection, some gremlin may cause it to act up. It's conceivable. So, keep on hand a parts list and spares of key parts for your steam traps and other system components. Parts are small and worth their weight in gold when you need them. A Sarco field engineer will make up a suggested list for you, if you tell us what components make up your system.

Might as well even keep a disc or two on hand for your Sarco Thermo-Dynamic Steam Traps, Type TD-50, even though they're so trouble-free our salesmen keep complaining about the lack of replacement parts business. We'll be glad to tell you about this unique steam trap in case you still don't know how miraculously simple and effective it is.

Pardon our monopolizing the conversation in this series of paid communiques, but we're trying our best to interest you in certain subjects that concern us both — to the point where you'll communicate.

5903

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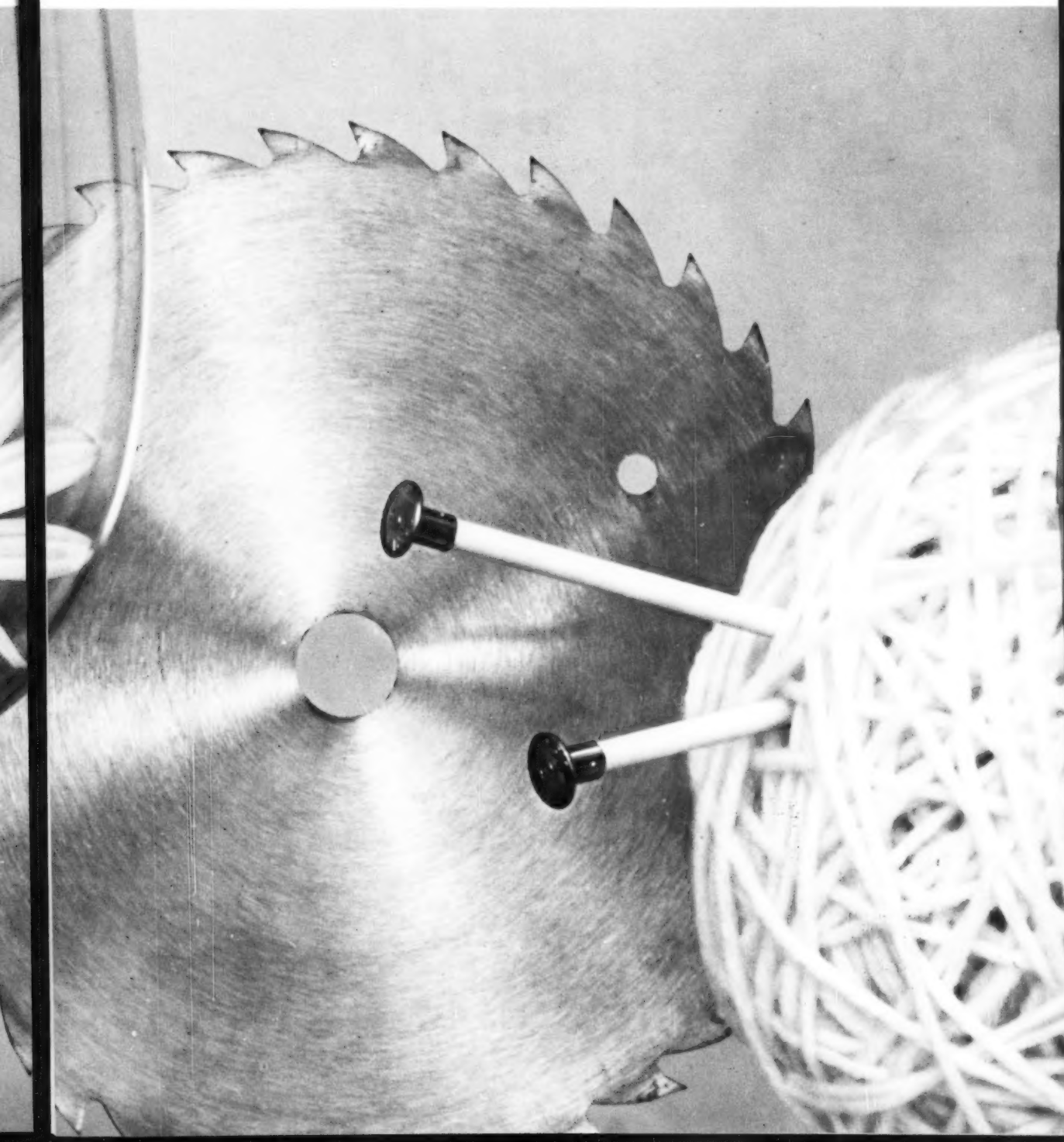

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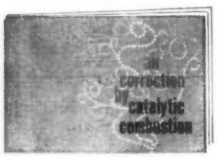

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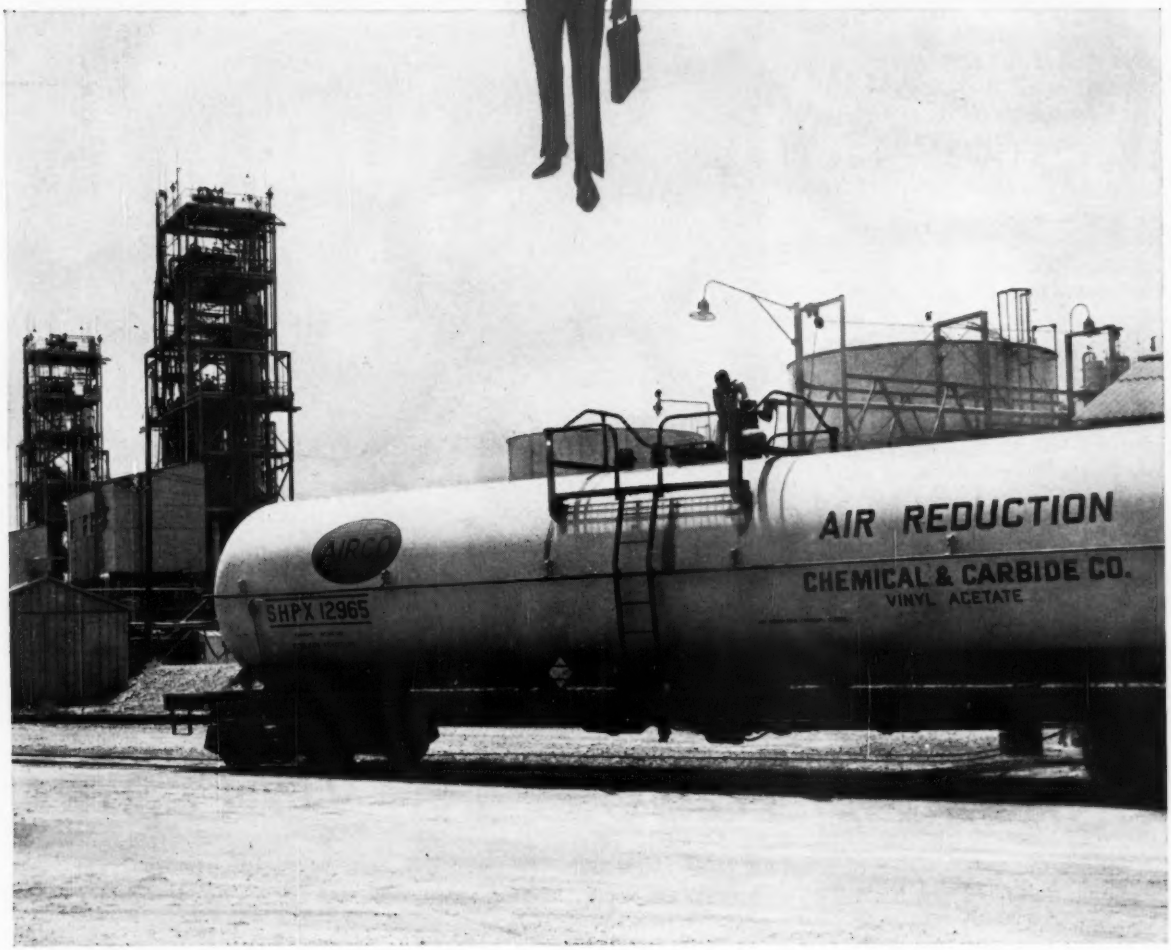

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CW PHOTO—W. ROSENBLUTH

Thomas Morningstar examines soon-to-be-marketed starch film.

New Face in the Film Field

Morningstar-Paisley, Inc. (gums, adhesives, starches) and Watson Flour Co. (prepared bakers' mixes) are principals in a joint venture, called Aquafilm, which will market a variety of water-soluble films. The new company's initial products will be a methyl cellulose film and a water-soluble potato starch film developed in M-P's Hawthorne, N.J., laboratories.

Successful development of the potato starch film gives M-P a commercial lead over a number of companies that have been trying for years to develop starch films from corn (*CW, Dec. 13, '59, p. 113*).

Aquafilm currently is negotiating for Dow Chemical's methyl cellulose film (Methocel) business, which Dow relinquished earlier this year. (*CW Market Newsletter, April 15*). Dow was making the film at Midland, Mich., marketing it through its Dobeckmun Film Division.

Watson (Woodside, N.J.) one of the top users of the edible film, was naturally unhappy to see Dow drop the product, decided if it couldn't buy the film it wanted to have a hand in producing it.

Aquafilm says it won't limit its product line to Methocel or potato starch films; it's planning to offer a complete line of water-soluble products. Production of the first films has been farmed out to a film maker, but the joint owners don't rule out the possibility of eventually making the films themselves. For its customers the new company not only will supply films but also will do contract packaging and offer assistance in test marketing.

Although M-P won't disclose what chemical process is involved in making potato starch film, J. D. Kehoe—head of the research project that yielded the film—says grafting the starch molecule was the important step. The film itself will be cast formed, offered in 1-3-mil thicknesses and up to 54 in. in width.

Major markets for the starch film, according to Thomas Morningstar, M-P vice-president, will initially be in the food field. In these applications, properties of the starch and Methocel, he claims, have distinct advantages, Methocel, for example, is not soluble in boiling water, which rules it out for use as packaging for soups. The starch film is soluble in boiling water and, when dissolved, acts as a thickener for soup. For the same reason, detergent packaging holds most promise for the starch film in the nonfood field.

For the Methocel film, on the other hand, food dyes, poultry feeds and bakery products shape up as sizable market possibilities. In Watson Flour the new company already has a solid captive market for Methocel. John Watson, research director and full partner of Watson Flour, points out that each year his company supplies Methocel-wrapped ingredients for more than 1 billion loaves of bread.

Potential competition looms from polyvinyl alcohol films, offered by Reynolds Metals and Mono-Sol Corp. (Gary, Ind.). Biggest markets for PVA film: packaging for detergents, dry bleaches, toilet bowl cleaners and household dyes.

Where's Corn? The introduction of a potato starch film may put a dent in the plans of several companies that have been aiming at corn starch. Included: National Starch and Chemical (New York), American Maize-Products (New York), A. E. Staley Mfg. Co. (Decatur, Ill.) and Stein, Hall & Co. (New York).

Although National Starch has carried out extensive research on starch films, it says that it has come to no decision on whether to manufacture a commercial product. In fact it may be having second thoughts on the whole idea of starch films. The firm admits to some tough problems—e.g., lack of heat sealability and water permeability—that haven't yet been solved.

American Maize's Vice-President-

Research J. W. Evans, tells CHEMICAL WEEK that the firm has supplied some of its raw material to a film maker for evaluation. American Maize does not intend to get into film manufacture, will only supply film makers with starch.

Evans feels that commercialization of corn starch films is still two or three years away. He anticipates that the starch will cost about 25¢/lb. when available in commercial quantities. He concedes that Staley or Stein, Hall, which have been working with fractionated starch, might be able to move a little faster than American Maize, which has taken genetically developed amylose as its route to films.

Last February Staley started working with a Dutch process for chemically separating amylose from ordinary field corn.

At Stein, Hall, Technical Director Paul Kaplan is not optimistic about the success of corn starch films. He says that the starch films' biggest drawback is that they need an internal plasticizer — and right now the only one that works is water. However, when the film is left exposed, water evaporates and the film becomes brittle. Efforts to counteract this have yielded only films with impaired water solubility.

Midwest Research Institute (Kansas City, Mo.), which has been working on amylose film development for the state of Nebraska, is now extruding clear, transparent film up to 10 mils thick. An institute spokesman claims the extruded film's clarity and tensile strength are equivalent to those of cellophane. Researchers expect to have a commercial amylose film process by early next year. They have done no work on the machine-handling properties of the starch film.

Cost Plus: Midwest Research is sure that its amylose—even at 30¢/lb.—can become the least costly of all soluble films.

Polyvinyl alcohol resin now sells for 85¢/lb.; Union Carbide's Polyox, polyoxyethylene, about the same; and carboxymethylcellulose, 40-55¢/lb. (film costs are 6-8.2¢/1,000 sq. ft.). However, projected selling price of Staley's amylose is 12-15¢/lb. in volume.

The U.S. Dept. of Agriculture at Peoria, Ill., is keeping in stride with industry developments in starch films, but officials there say they've had problems in getting a successful internal plasticizer for the amylose. Thus they have expanded their program to include a search for this as well as for an extrusion procedure.

Backing up both USDA and MRI in the development of high-amylose corn is Bear Hybrid Corn Co. (Decatur, Ill.). Bear, commercial for more than a year with a Class 5 (50-60% amylose) hybrid, is now experimentally growing Class 6 (60-70% amylose) and Class 7 (over 70% amylose). Harvest yields are comparable to those of regular corn, averaging about 100 bu./acre and weighing the standard 56 lbs./bu. The exact acreage that Bear is cultivating wasn't disclosed, but if an estimated 1,000-2,000 acres are planted the amylose yield—at 55% of corn's total starch content—would be 3-6 million lbs. (1 lb. of amylose makes up about 19,000 sq.in. of 1 mil film).

Bear's president, Robert Bear, says all breeding work to date has been successful, predicts that Class 7 should be commercially available soon.

The new joint venture of Morningstar-Paisley and Watson means added competition for existing soluble-film makers, but the list won't stop there.

Borden Chemical, which manufactures the polyvinyl alcohol resin used for the film made by Mono-Sol and Reynolds, has a casein type of soluble film under development. And at least four companies are looking at carboxymethylcellulose films.

EXPANSION

Textile Chemicals: A new company, Chemol, Inc., has been formed at Greensboro, N.C., to manufacture chemicals for the textile industry. It will produce chemicals derived from fatty materials, is said to have invested $250,000 in the first phase of a program that will include construction of a 9,000-sq.ft. building. President of the new company is Stanley Frank of Greensboro.

•

Paper Property: Union Bag-Camp Paper Corp. (New York) is negotiating purchase of Write-Right Mfg. (Atlanta), maker of a $2-million/year line of paper writing tablets and pads.

•

Adhesive Entry: Metro Adhesive, Inc., is the name of a new organization formed to make glues for the bookbinding, packaging, paper converting, and general laminating industries. An affiliate of Hudson Industries Corp. (Hudson, N.Y.), the new organization will have plant, sales offices and labs at 2805 Paterson Plank Rd., North Bergen, N.J. Julian Wolfenstein, formerly of Borden Chemical, and American Polymer Corp. has been made sales manager of the company.

•

Adds Alkyds: Synvar Corp. (Wilmington, Del.), producer of protective coatings, has added alkyds and tall-oil esters to its resin line. A new plant for making these materials has been built on the Delaware River just south of Wilmington. The company has another plant at Greensboro, N.C.

•

Space for Specialties: Huntington Laboratories (Huntington, Ind.) will build a 40,000-sq.ft. office and manufacturing plant in Lansdale, Pa. Plant will be used in manufacture of soaps, cleansing agents, germicides, floor polishes and other specialties.

•

Looking West: Laurentide Chemical Inc. (Shawinigan, Que.) maker of auto chemicals, paints and lacquers, plans to build a 20,000-sq.ft. plant in New Brunswick Province; construction will begin either this fall or early spring. Unit will supplement the company's present 22,000-sq.ft. plant in Shawinigan.

•

Soap Site: Soap Specialties Inc. (Princeton Ave. and Wissinoming St., Phila.) is planning to erect a new, one-story, $500,000-building on a 3.1-acre tract in the Torresdale section of Philadelphia.

PRODUCTS

Impregnated Sponge: Crest Laboratories (Newton Lower Falls, Mass.) is marketing a package of five sponges impregnated with cleaning and polishing compound. Each miniature sponge (size: 2 x 1½ in.) has a plastic holder that fits over one end. The product is intended for cleaning ashtrays, mirrors, jewelry, glassware and silverware.

•

Aluminum Lube: A water-emulsion lubricant for aluminum, called Striplube, has been developed by Fiber Products Research Center Inc. (Beaver Falls, N.Y.). The emulsion

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is said to aid deep-drawing and stamping of foil or sheet metal without the need for subsequent degreasing. It's also intended for use on paper foil laminates to increase slip and non-blocking characteristics.

•

Color Compatible Emulsion: A vinyl acetate copolymer emulsion, with a high degree of pigment compatibility, is being marketed by Dewey and Almy Chemical Division, W. R. Grace & Co. (Cambridge, Mass.), under the name Everflex CA. The emulsion is said to be compatible with all "universal" and water-base tinting color systems, requires minimum amounts of surfactants (which lessen water resistance and adhesion). The emulsion is also said to have outstanding freeze-thaw resistance, a low odor level and extremely low pH drift (reducing yellowing and gassing).

•

Insect Repellant: Chemspex Inc. (St. Petersburg, Fla.) is offering a granular form of insect repellant designed to be scattered on lawns like grass seed; it provides 24-hour protection against gnats, mosquitoes and other biting insects. The repellant is sold in 1½-lb. bags (price 79¢), said to be enough to treat a 3,500-sq.ft. area.

•

High-Slip Coating: A polyethylene formulation that produces glossy coating with a low coefficient of friction has been developed by Eastman Chemical Products under the name Tenite Polyethylene 1H55P. The new product contains a slip additive capable of withstanding melt temperatures up to 600 F. The high slip of the formulation is said to be especially advantageous for coated paper that is to be fabricated into glossy cartons on high-speed packaging machinery.

•

Premeasured Detergent: Lever Brothers has added another product to the growing list of premeasured detergents. The latest, a package called Measurematic, delivers a predetermined amount of granular detergent (Rinso) at each pouring. The package idea was once used for a detergent called Weigh, which was sold in the New York area by the developer of the product, U.S. Metered Container Corp. (25 Central Park West, New York). Mead Corp. (At-

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Available in a number of types of varying acetyl contents and viscosities.
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Principal uses include:
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Melt Coatings
Heat seal adhesives
Strip coatings

Oxidized Cellulose
For absorbable surgical gauze

For properties and shipping information on these and other Eastman products, see **Chemical Materials Catalog,** page 225, or **Chemical Week Buyers' Guide,** page 113.

Eastman

Weekend work to catch the boat

"An order for special process cellulose acetate for South American delivery doesn't come every day of the week," related a Cellulose Esters Division production supervisor, "and frankly in this instance I thought someone had eased us pretty far out on the proverbial limb.

"It was Tuesday, November 15, 3:00 P.M. in Kingsport, Tennessee. The order plainly stated in the appropriate column that the material should be delivered to Pier 22, Port of New York, six hours prior to the boat's scheduled departure at 8:00 A.M.—on Tuesday, November 22. This meant that the material had to leave our plant by rail car on Thursday, November 17, at the latest.

"Now, then. First, the order was for 66,100 pounds. Second, it was not a standard inventory type of cellulose acetate. True, we had previously supplied this special material, so it was not a question of "know-how." But scheduling the production and all that goes with it, such as special controls and laboratory tests, bagging and loading crews, etc., posed a real problem.

"After a quick call to our order writing department to be sure everyone was all right over there, and upon confirmation of this and the accuracy of the order, we went to work.

"To make a long story short, we did *not* get the rail car loaded on Thursday. But by revising production schedules, weekend work for the technical staff, extra bagging and loading crews, and three fast trucks leaving our plant early Monday morning, November 21, we didn't miss the boat."

Another example of the interested personal service you get when you buy from Eastman.

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lanta, Ga.) makes the Rinso package through a license agreement with USMC.

•

Detergent Tablet: Aspen Corp. (Syracuse, N.Y.) has joined the growing list of companies supplying laundry detergent in tablet form. Called Disc Detergent Tablets, it comes in a 12-tablet box.

•

Phenolic Core Binder: Durez Plastics Division, Hooker Chemical Corp. (Niagara Falls, N.Y.), is marketing a fast-curing modified liquid phenolic resin and accelerator for use in core binders. Cure time in the hot core box is about 15 seconds at 500 F. Proportion of binder used is 2% of total sand weight.

•

Fire-Retardant Gel Coat: Presto Chemicals Inc. (9346 Glenoaks Blvd., Sun Valley, Calif.) has developed a fire-resistant material called Gel Coat. It reportedly can be applied with a simple spray gun, is suggested for shower pans, drain boards, boats. It's applied as an 8- to 10-mil coating.

•

Latexes Allowed: Dow Chemical's Latex 630 and S-3352 have been approved by the Food & Drug Administration for prolonged use in contact with food. The styrene-butadiene latexes are used as binders in pigmented paper and paperboard coating; the S-3352, where low odor is desired.

•

Dry Bleach: Procter & Gamble has introduced a chlorine dry bleach product, Stardust, into the Grand Rapids, Mich., and Albany-Troy-Schenectady, N.Y., areas. It's a heavy-duty product, comes in the form of blue granules in a foil-wrapped box with a pouring spout. There are two sizes: 13 oz. and 26¾ oz.

•

For the Birds: The A. Z. Bogert Co. (West Point, Pa.) has developed a new bird repellant. Called "4-The-Birds," the material is a sticky compound that is applied with a putty knife or calking gun. It remains tacky at low temperatures, reportedly won't run at high outdoor temperatures. The material (said to be effective for a year) is applied to ledges, ½ in. from the edge, in strips 1 in. apart. One gallon covers 130 linear ft. Availability: in cartridge, 1 gal. and 5 gal. sizes.

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Chlorinator. Chilled water pumped through the titanium coil carries off heat evolved when lime slurry is chlorinated. Coil has been completely trouble-free, despite *hot*, wet chlorine environment. No need for repairs. And the chemical buildup on the coil is easily washed off with water.

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Crystallizer tank. Still in place after three trouble-free years, the titanium coil has far outperformed a vinyl-coated stainless steel coil that lasted for only one year.

Titanium costs are dropping. For example . . . the latter titanium coil originally cost $6,200. As an experiment, Pennsalt engineers had the unit re-estimated recently. They found that they could purchase a new coil—including an additional $850-worth of spacers—for a total of $4,204!

Lesson to be learned: Selection of the *right* titanium fabricator (TMCA can help you with this) is a sure-fire way of controlling your costs. Also, basic metal prices are improving. In the past three years they have been reduced by 50%.

If you are faced with maintenance problems in equipment operating in wet chlorine . . . or hypochlorites . . . or urea . . . or inhibited sulfuric acid, contact TMCA. Our chemical experience is at your disposal.

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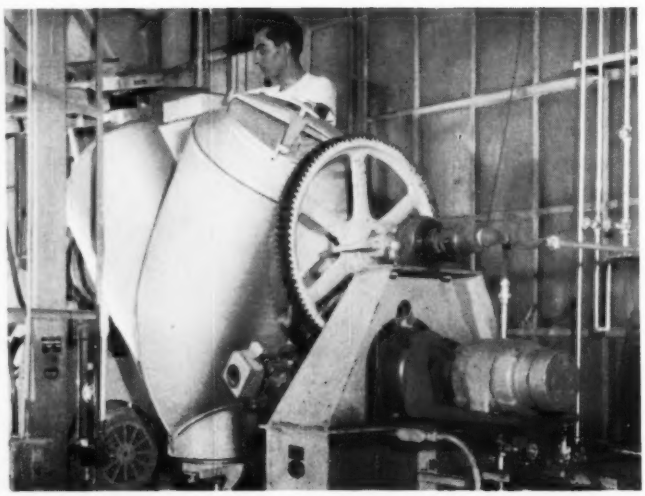

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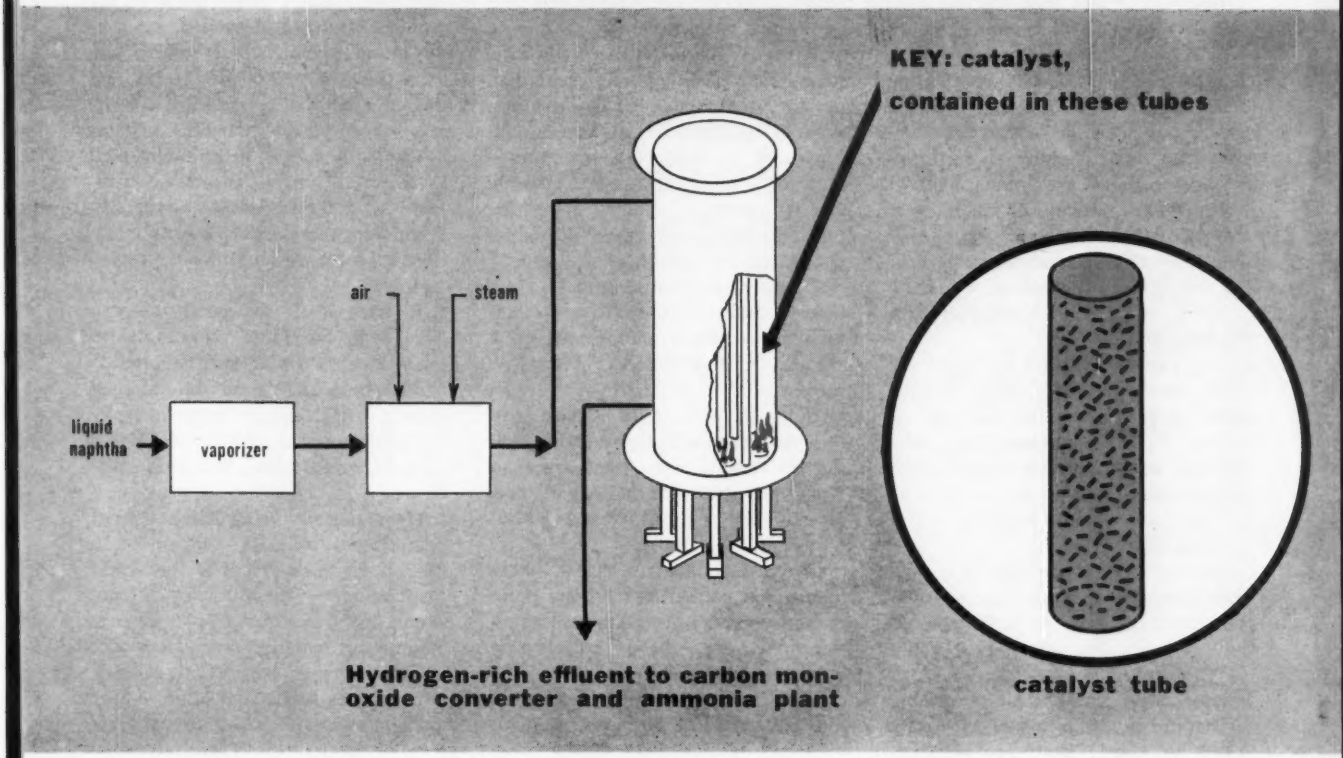
New Process Steam-Reforms Naphtha for Hydrogen Production



Help for Hydrogen-Hungry CPI

Three firms disclosed this week that they have processes or plants under development to steam-reform naphtha to make hydrogen. If such efforts attain commercial status, naphtha will become an alternate raw material to natural gas or fuel oil in hydrogen manufacture. Significance: a new tool to help processors supply mounting worldwide demands for hydrogen.

In this country alone hydrogen consumption is expected to expand from 1.9 billion cu.ft./day in '60 to 3.7 billion in '65.

Chemical Construction Corp. (New York) reveals that it has had a steam-reforming process for naphtha under development for some time. Many successful runs reportedly have been made in the firm's New Brunswick, N.J., pilot plant, and the results are being correlated for engineering designs. Chemico says that it will soon be in a position to offer this process for sale.

In addition, M. W. Kellogg (New York), which has been offering a steam-reforming process for naphtha as part of its ammonia plant package, reports that one plant using this process is currently under construction.

And Selas Corp. (Dresher, Pa.), which recently won the contract to supply furnaces for Tidewater's 50-million-cu.ft./day hydrogen plant at Avon, Calif., says it is intensively researching steam-reforming of naphtha.

Hydrogen is produced by two basic routes today:

(1) Conversion from natural gas (mostly methane) via the steam-reforming process being adapted to naphtha.

(2) Via partial oxidation of fuel oils by processes licensed by Texaco and Shell.

Steam-reforming has been limited to light hydrocarbon gases. But using a naphtha feed (paraffin hydrocarbons in the range of heptane and octane), the process is being extended to liquids. Upshot:

- Hydrogen producers will gain new flexibility in the raw materials they can utilize, although it remains doubtful, at least for the near future, that many operators will use steam-reforming to make hydrogen from naphtha in the U.S. Since the raw material for hydrogen production is selected on a cost/Btu. basis, natural gas is the usual choice because it's the cheapest. Naphtha, which can be cracked into gasoline, commands price premiums above those of fuels. So steam-reforming of naphtha will be aimed toward overseas markets, where the supply-demand picture is different.
- Research emphasis in steam-reforming technology is switching from materials of construction to catalysts. Recently, new tubing materials have been developed that permit increasing the pressure of the steam-reform-

ing plants to about 250 lbs./sq. in. gauge. But a switch to heavier hydrocarbons means that new catalysts will be required for optimum yields.

• Hydrogen production via partial-oxidation processes will be meeting new competition overseas. Natural gas is not available in many foreign countries. Thus many plants have followed the partial oxidation route because of the processing flexibility it offers. To date, about 50 partial-oxidation plants have been built: eight in the U.S., 42 overseas. Of these overseas plants, four have specified a naphtha feed.

But partial oxidation pays a heavy price for its flexibility. Because 98% pure oxygen is required for the reaction, an air-separation plant must be built to supply this oxygen. This boosts costs, adds to the complexity of the process, and increases utility consumption.

Studies by Chemico engineers show that investment for a partial-oxidation plant to make 15 million cu.ft./day of hydrogen will run to about $230/1,000 std. cu.ft. of hydrogen. A similar plant using steam-reforming of natural gas will cost about $150/1,000 std. cu.ft. Since raw-materials consumption is equivalent on the basis of heat value, this means that hydrogen from naphtha, via the steam-reforming route, can pay a healthy premium over fuel oil going through the partial-oxidation route. This comparison neglects the costs of utilities, labor, etc., which are reported higher for the partial-oxidation processes.

From Tube to Catalyst: Thus, the all important question is: Can steam-reforming utilize naphtha as efficiently as it can natural gas? The answer seems to lie in new catalysts, which all firms are keeping under tight wraps.

This emphasis on catalyst is a switch from the trend toward improved tubing materials. The steam-reforming action takes place inside catalyst-filled tubes that run from top to bottom of the furnace. Temperatures are 1200-1600 F under atmospheric pressure, up to 1400-1600 F at pressures ranging up to 250 lbs./sq.in. gauge. Tube walls are 100-200 F higher than this.

Finding the right materials for tube walls at these temperatures has been a problem. But modern steels —in particular centrifugal casting of alloy tubes, which resist oxidation while maintaining strength—have solved this problem.

When using naphtha feedstocks, pressure becomes less important than the catalytic reaction inside the tubes. Although a number of factors are important to successful operation—heat input from the furnace burners, the temperature gradient along the tubes, pressure—all these variables depend on the catalyst.

Currently, steam-reformers are known to use a catalyst that's essentially nickel oxide impregnated on a silicate. Any differences in catalyst properties are achieved by varying method of production. Other than this, the exact catalyst makeup is considered proprietary know-how, although all firms have indicated a new type of catalyst is the secret to steam-reforming of naphtha.

Chemico emphasizes that it has a modified catalyst that allows continuous operation. Importance: steam-reforming of naphtha is relatively easy in a cyclic process (in which the catalyst is regenerated by burning off the carbon). But continuous operation requires catalyst activity high enough to avoid carbon poisoning.

Route to Reforming: All steam-reforming reactors consist of a furnace in which the catalyst-filled tubes run from top to bottom. The reaction takes place during one pass through this catalyst. As the feed is brought into the tubes, three things happen simultaneously:

(1) Heat from the burners in the furnace flows through the tube walls, raising the temperature of the feed mixture.

(2) As the temperature of the mixture rises, the steam-reforming reaction begins. This reaction occurs faster as temperatures increase. At the same time, some of the hydrocarbon in the feed begins to crack, laying down carbon on the catalyst.

(3) The steam-reforming reaction is endothermic, taking up heat as it progresses. Thus the faster it proceeds, the more heat it requires. This counteracts the effect of the temperature rise caused by heat coming in through the tube walls. Depending on tube dimensions, catalyst, heat input, these counteracting effects tend to balance each other to produce an equilibrium condition characteristic of the reactor. And the state of this equilibrium has a direct effect on the amount of carbon deposited.

Carbon a Killer: But carbon poisons the catalyst, so it must be removed as it is formed. This is the primary purpose of the high ratio of steam (4:1 on carbon) normally used in steam-reformers. The steam combines with the carbon in a reaction resembling the classic water-gas reaction to form carbon monoxide and hydrogen.

In addition to the steam, air can also serve the same purpose, since air will burn the carbon deposits to carbon monoxide. And the nitrogen carried in with the air serves to make a hydrogen-nitrogen mixture that is easily adapted for ammonia synthesis.

Hydrogen and Heat: It takes about 460,000 Btu. to make 1,000 std. cu.ft. of pure hydrogen. This is true when the hydrogen is manufactured from almost any hydrocarbon, whether natural gas, naphtha, or oil. It is also true for all processes, whether steam reforming or partial oxidation. All of these processes utilize waste heat recovery systems outside the reactors to maintain efficiencies; and the waste heat recovery systems give equivalent results.

Since the cheapest hydrocarbons are generally used for fuel, the markets for fuel keep their cost per Btu. in a dynamic equilibrium. Natural gas sets the standard in the U.S. at prices ranging from about 10¢/million Btu. (22¢/std. cu.ft.) in the Gulf Coast area to about 20¢/million Btu. on a nationwide average. Btu. prices for fuel oil usually match this. And raw material costs per 1,000 std. cu.ft. of hydrogen are therefore equivalent.

But because capital costs for a steam-reforming unit are lower, they usually choose steam-reforming. Recent examples are the 14-million-cu.ft./day unit built for Linde by Chemico at Ontario, Calif. and the 50-million-cu.ft./day plant now under construction for Tidewater. Both use steam reforming of natural gas.

But the reverse of this situation exists in most of the world's less developed countries and parts of Europe. Natural gas is unavailable. And local demands for heating oils place a premium on fuel oil that makes it

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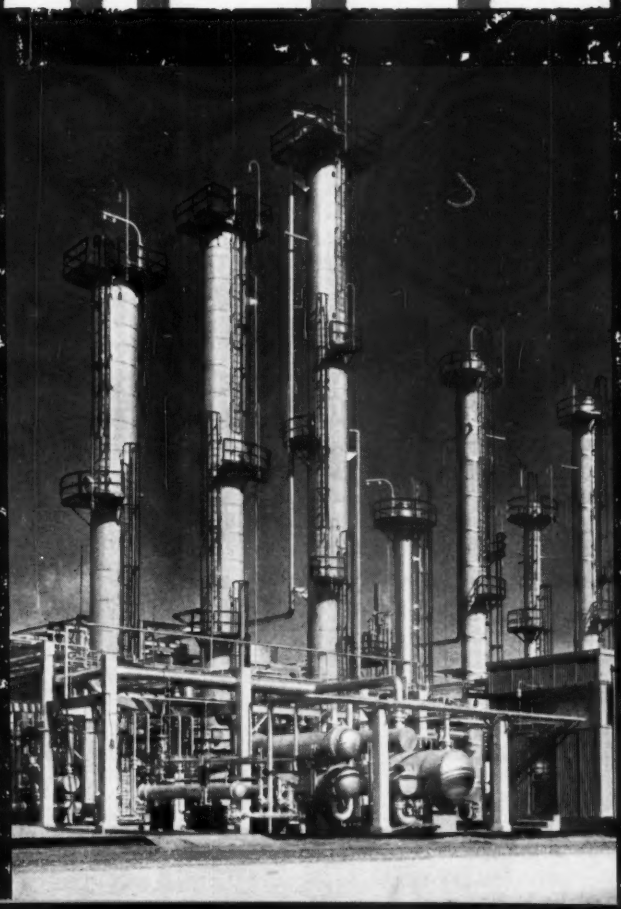

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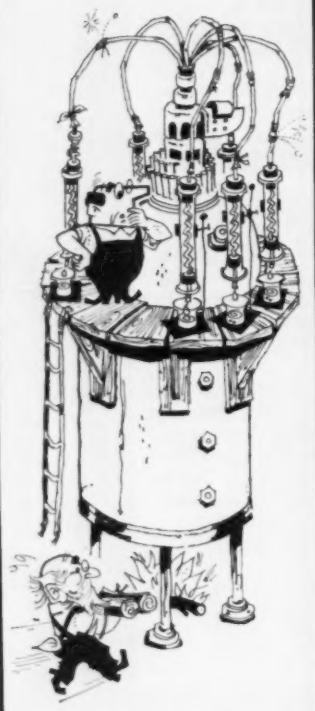

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almost as expensive as naphtha. Yet some of these areas offer the biggest markets for hydrogen. And it is in these areas that the new steam-reforming of naphtha processes will be bidding for their development profits.

Japan Sells Know-how

A new Chemical Week survey shows that Japanese income from patent royalties and technical fees has grown steadily since '52—from $6.7 million to $87.3 million in '60. And a spot-check among some of the larger firms shows that '61 is likely to be their biggest year.

Six Japanese processes have been licensed to foreign firms since the beginning of the year:

(1) Production technology for Poval and Vinylon — to Farbwerke Hoechst (West Germany) by Kurashiki Rayon. This contract, signed in January, includes technical and production know-how for polyvinyl alcohol and polyvinyl alcohol fibers.

(2) Lignin liquidation patents and technology — to Crown Zellerbach (*CW, May 13, p. 77*) by Noguchi Institute.

(3) Processes for triple polymerization of dicyandiamide—to Edison Co. (Italy) by Japan Carbide. This contract, signed in April, calls for an exchange of information and training of Italian personnel to produce melamine reagent and resin.

(4) Processes for cadmium and titanium alloy plating — to all subsidiaries of Boeing Aircraft by Toyo Metal Chemistry.

(5) Parametron computer component patent rights—to National Cash Register Co. in the U.S. by Parametron Institute.

(6) Fluorine fiber production technology—to French Société Rovyle by Daiwa Spinning. Although a provisionary agreement was signed June 7, Daiwa Spinning won't comment on the agreement until it receives final approval from the French government.

In addition to these contracts, 11 licensing and patenting agreements are being negotiated. Although some are known to include *p*-xylene isomerization, nodular graphite steel, polymerization of polyether rubber, acrylonitrile fibers, rayon acetate, urea fibers and a photo energy process for nylon, royalty details will not be known until after the agreements are completed.

PROCESSES

Nickel with Hydrogen: Hydrogen serves a twofold purpose in recovering nickel and cobalt in the Sherritt Cordon Nickel Refinery at Edmonton, Alta. Ammonia, made with hydrogen converted from natural gas, is used to leach a nickel-copper-cobalt concentrate. The aqueous solutions of nickel and cobalt are reduced under pressure with hydrogen from the same source. The concentrate is pulped with the leach solution when it enters the refinery; and every operation is carried out with the pulp kept fluid, except in the final drying and briquetting of the nickel and cobalt powders. Energy requirements are said to be less than for smelting or electrolytic refining processes.

•

Photopolymer Printing: A new photopolymer, which Du Pont says has cost it $10 million and 12 years' research, will be in commercial production in Parlin, N.J., this week. In producing photosensitive plates, the plant will use a secret process to cut exposure times from seven minutes to about two and one-half minutes. Du Pont says over-all manufacturing costs are reduced enough to allow a 17% cut in price of the plates. Plate sizes up to 40.5 x 76 in. will come in six different types suitable for letterpress reproduction.

•

Designs on the Wall: A novel drafting technique, called Panoramic Design Technique, has been developed by TAB Engineers, Inc. (Chicago). The new method is claimed to effectively eliminate the need for drafting boards. Instead, engineers use chalk to put their designs on a floor-to-ceiling blackboard, which is under constant surveillance of the project engineer. As soon as designs are approved, dimension data is added, and the blackboard drawing is photographed. Reproductions of photographs are then used to prepare models for the detailing, piping take-offs, etc. TAB says the system can cut engineering design time 50%.

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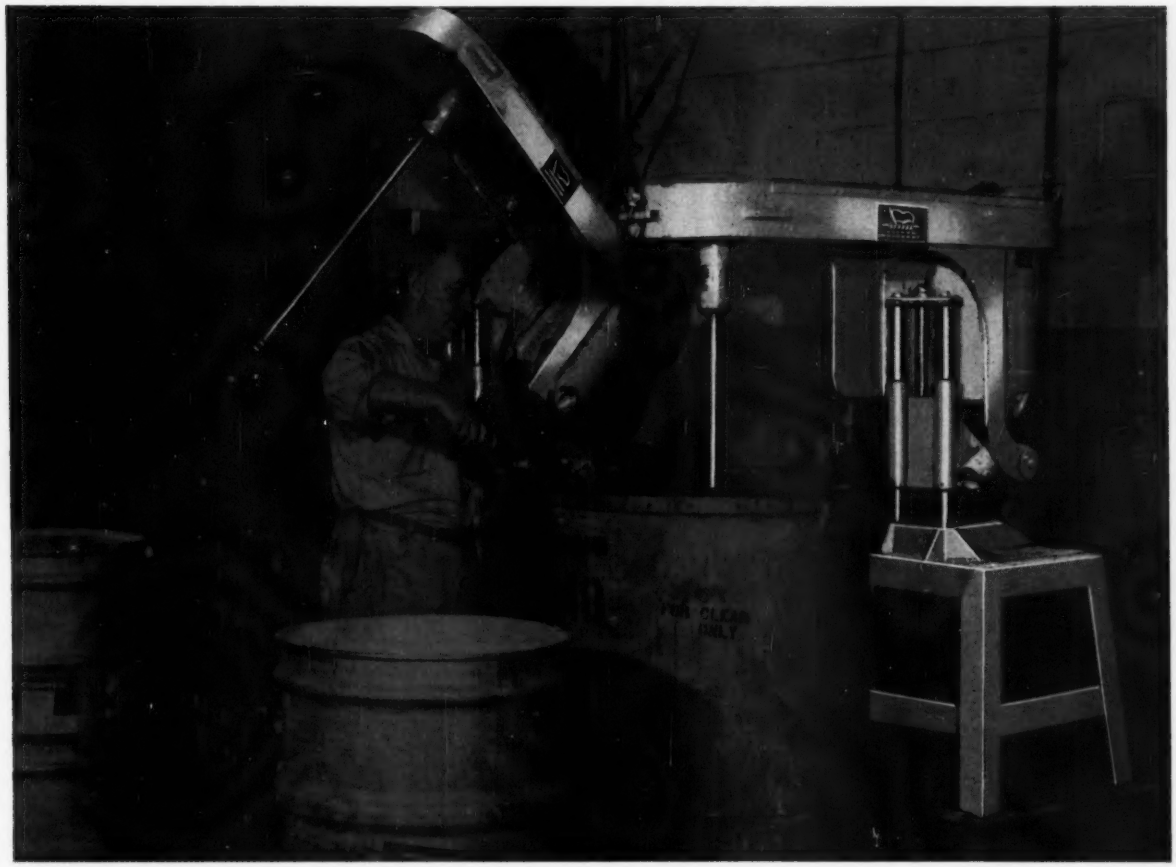
Hungarian Hypersorption: Engineers at the Hungarian Petroleum and Natural Gas Research Institute (Vesprem) have developed a hypersorption process to separate light hydrocarbon gases by adsorption on acti-



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R. L. Colvin, Superintendent of the Gilbert Spruance Co. of Philadelphia, well-known manufacturer of paint, varnish and wood finishing products writes—"Our customers must have the fastest possible service, due to the nature of their business."

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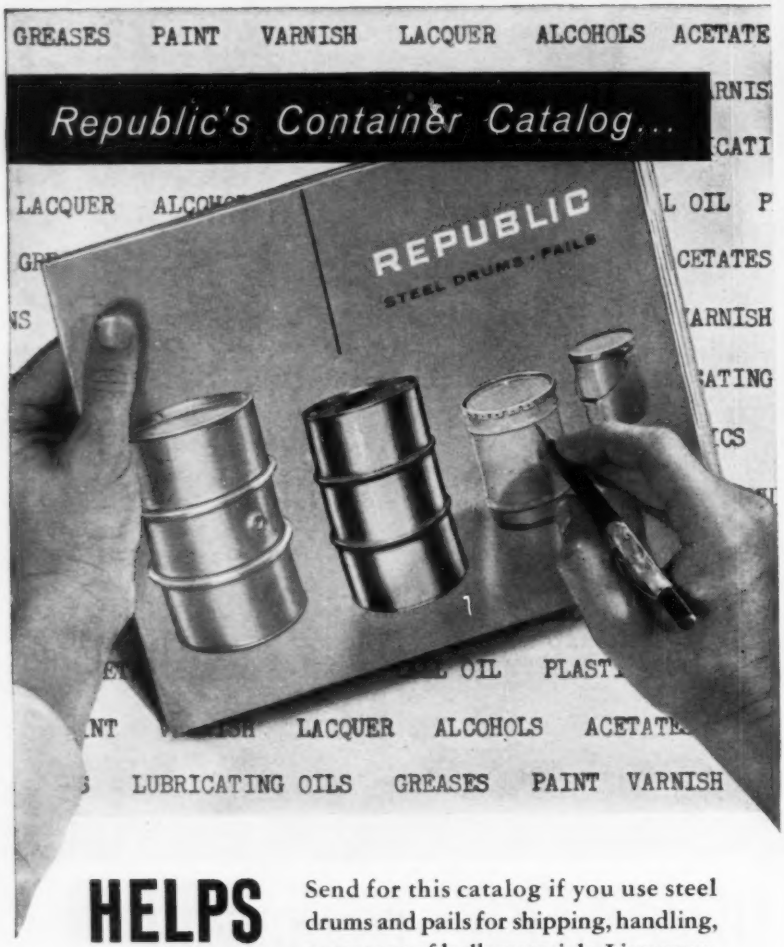

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vated carbon particles. Key is a tall (98 ft.) column, which employs principles of operation similar to those of the hypersorber developed in the U.S. by Union Oil several years ago. Two small columns less than 20 in. in diameter have been put into operation in Hungary. The activated carbon has grains about ⅛ in. long, ¼ in. in diameter. It is regenerated by flue gases at 900 F in a shell and tube heat exchanger. The carbon leaving the bottom of the column is recycled to the top by a gas lift employing product gases. Attrition dusts are recovered by cyclones in the top gas discharge pipes.

•

Oil from Sands: A thermal recovery process using underground combustion to force up crude oil has proved successful in Allen County, Kansas. Approximately 55-60% of the oil left in partly depleted sands was recovered, engineers of Sinclair Research, Inc., told the American Institute of Mining, Metallurgical and Petroleum Engineers in Dallas last week. Peak production was 2,600 bbls./day. Costs were about $1.20/-bbl.

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Czech Gas: Strojimport, the Czechoslovakian State Foreign Trade corporation in Prague, has sent out invitations for bids for construction of a gas plant in Czechoslovakia. The Czechs want a process to separate natural gasoline from gas. Capacity reportedly will be about 35 million std. cu.ft./day. Austrian, British and French engineering contractors have been invited to bid on the project, while West German and Japanese firms have also requested permission to bid. Product gas will be for municipal consumption.

•

Zinc-Lead Smelting: Imperial Smelting Co. has built a lead blast furnace at Swansea, Vancouver, that is carefully designed and controlled to simplify the simultaneous recovery of zinc and lead. It is building another in Australia. In the process, zinc leaves the top of the furnace as a vapor; the vapor is condensed in a spray of molten lead; the mixture of molten zinc and lead fall into a bath, where the zinc comes to the top and is skimmed off. This route offers an improvement over processes in which zinc is recovered as slag from the lead

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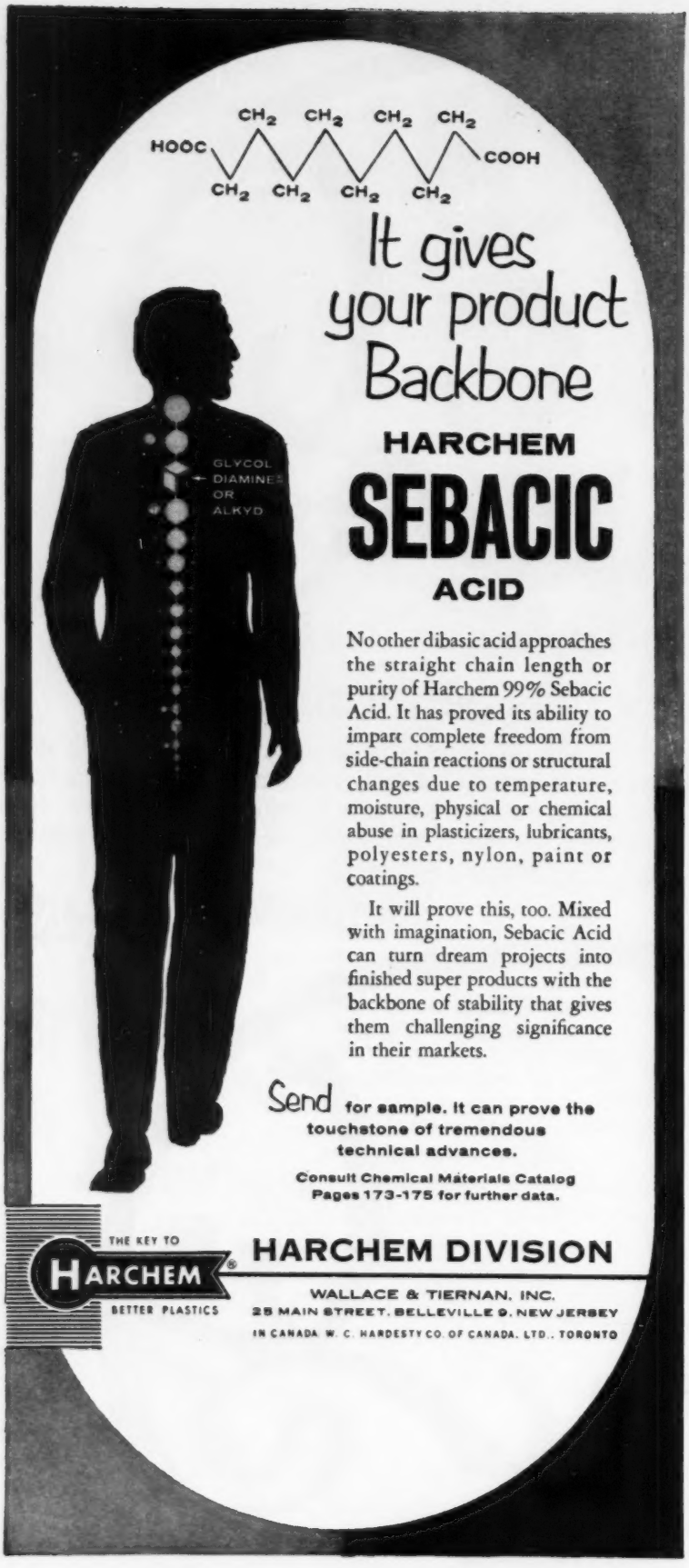
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furnace, then distilled out of the slag in a separate fuming furnace.

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French-Belgian Reactor: The definitive contract has been signed between Westinghouse Electric International Co. and Euratom representatives for construction of the 242,000-kilowatt French-Belgian nuclear power plant that was planned last year. This plant will use the Westinghouse design, employing a closed-cycle of pressurized water to carry heat from the nuclear reactor to the power plant. The nuclear portion of the plant will be in a cavern within a hill at a bend in the Neuse River. Auxiliary equipment will be in a nearby cavern. The electric generating unit will be outside. Participating firms with Westinghouse are Ateliers de Construction Electrique de Charleroi (Belgian) and Framatome (French).

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Pyrosulfite Profits? Engineers of the Institute for Inorganic Chemistry of Usti nam Lab (northern Bohemia, Czechoslovakia) claim to have developed an improved method of recovering the 6-7% sulfur dioxide occurring in off-gases from sulfuric acid plants, etc. They use an absorption solution saturated with sodium bicarbonate and sulfur dioxide; ratio of acid to sodium ions is 0.85. As the off-gases pass through the solution, the sulfur dioxide forms sodium pyrosulfite, which, since the solution becomes supersaturated, is precipitated in a special hydrocyclone. This avoids the costs of evaporating the sodium sulfate solution to a solid. Sodium pyrosulfite is said to have vast market potentialities as a preservative for hay in farm silos.

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Contact Cracking: The Soviets claim to have a new cracking process for upgrading reduced crude and vacuum residues from atmospheric and vacuum distillation units. The new process uses seed coke as "catalyst," similar to U.S. processes for continuous coking, except that pressures range between 280 and 430 lbs./sq.in. gauge. Temperatures in the reactor are about 930 F. Claims for the process are: higher conversions per pass, higher yields of valuable gasoline-naphtha range products, better gasoline octane number, smaller off-gas losses, savings by avoiding compression on the off-gases, and a high-quality coke suitable for electrode production.

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CHEMICALS OUTLOOK

October, 1961

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Technology
Newsletter

CHEMICAL WEEK
October 21, 1961

A new post-emergent herbicide for tomato crops is being readied for commercial introduction next spring. An anilide, called Solan, it's made by FMC's Niagara Chemical Division, is said to be the first such herbicide safe for tomatoes. Chemically, N-(3-chloro-4-methylphenyl)-2-methyl pentanamide, it's related to another Niagara anilide herbicide, Dicryl, N-(3,4, dichlorophenyl) methacrylamide, used on cotton. Target for the product: the U.S. annual tomato crop of 5 million tons. If it were used at the recommended twice-a-season rate on all the tomatoes grown, it would mean a 3.6-million-lbs./year market.

Cost to the farmer would be $10-30/acre. But by cutting down weeds, it would permit the entire crop to ripen and make the use of mechanical harvesters feasible. Also, tomatoes could be field seeded (instead of transplanted).

•

The Egyptian government wants a cheap, simple spray for cotton worms. The U.A.R. Minister of Agriculture, Sayed Marai, is offering a $2,500 prize to anyone who can come up with such a spray. It would be of course, a sizable potential for chemicals. Official estimates are that the cotton worm ruined 30% of the current crop, causing damage of about $50 million.

Air freight shipments of Sevin carbamate insecticide by Carbide helped hold the damage down. Trouble is that the effort got started too late. And air shipment was expensive. The normal rate would have been 92¢/lb, but Carbide managed to have it shipped at 47¢/lb. Even so, the Egyptian government paid out more than $1 million in shipping charges alone. Egypt is importing Sevin by water shipment for next season. And it has decided not to try toxaphene again because the insects have built up resistance to it.

•

Underground storage of liquefied methane was demonstrated last week by Conch International Methane and Constock Pritchard. Idea: freeze the ground surrounding the area to be excavated, dig a hole, install a vapor-tight aluminum roof and fill with the liquefied gas for storage at –258 F. Advantages claimed over aboveground storage: it's cheaper and safer.

Work on the project was started late last year. For 30 days before last week's demonstration, the project scientists checked for gas leaks and ground swelling problems. They found none. An additional possibility for such a project suggested by Pritchard (*CW, Oct. 14, p. 92*) is recovery of the cold value from the expanding gas.

•

A talking computer, Unicall, was unveiled by Remington Rand Univac Division of Sperry Rand at dedication ceremonies for its $20-

million engineering center last week in Whitpain Township, Pennsylvania. The new device permits transmission of inquiries from remote stations; it answers with stored information, in a computer-generated voice. The firm feels that the computer will find work in a number of industries.

•

Another new material for solid-state masers has been discovered by Bell Laboratories Researchers. It's neodymium in calcium tungstate, and will be described in the November issue of "Proceedings of the I.R.E." An optical maser has been built from the material; it operates at room temperature with as little as five joules of input power. Previously, Bell had developed a gaseous optical maser, using helium and neon (*CW, Feb. 11, p. 54*); IBM has worked on uranium- and samarium-doped calcium fluoride (*CW, Dec. 24, '60, p. 67*). Hughes Research Labs and Bell have developed solid masers employing synthetic ruby.

•

A scheme to run turbines with gases generated by biological cattle wastes is being investigated by AiResearch Manufacturing Division of Garrett Corp. (Phoenix, Ariz.). Cooking the waste drives off methane, leaves an almost-odor-free black liquor that contains original fertilizer value. The 250,000 cattle on Arizona feed lots could provide the energy equivalent of 85,000 gal./day of diesel fuel, worth $18,000.

•

A compact steam generation unit will be offered by Thiokol's Reaction Motors Division. The generator is only 4 ft. high, 3 ft. in diameter, but will produce 150,000 lbs./hour of steam without a warmup. The unit, called the Hyprox Combustor, was developed by Thiokol as part of a joint program for subcooling liquid hydrogen with Croll-Reynolds. It uses hydrogen peroxide and hydrogen as fuel. The hydrogen peroxide is decomposed catalytically; oxygen in the decomposition products is afterburned with hydrogen to produce superheated steam. Ignition of the unit is spontaneous, controlled by regulating the temperature of the reaction chamber.

Cost of a complete system, which can be set up for operation within three months, is $100,000. However, the cost of hydrogen peroxide rules out operation as a continuous generator, limits it to stand-by, peak-load or pilot-plant operation. With Croll-Reynolds steam jet ejectors, the unit can also be used to create high vacuum.

•

A more accurate measurement of fluid flow is the claim Automation Industries (Torrance, Calif.) makes for a new system employing radioisotopes. A new division has been set up that will operate under license arrangements with California Research Corp. It will offer fluid-flow-measurement services to the oil, gas and chemical process industries. Cal Research has developed a "total count" method of measuring flow by radioactivity (*CW, March 15, '58, p. 70*).

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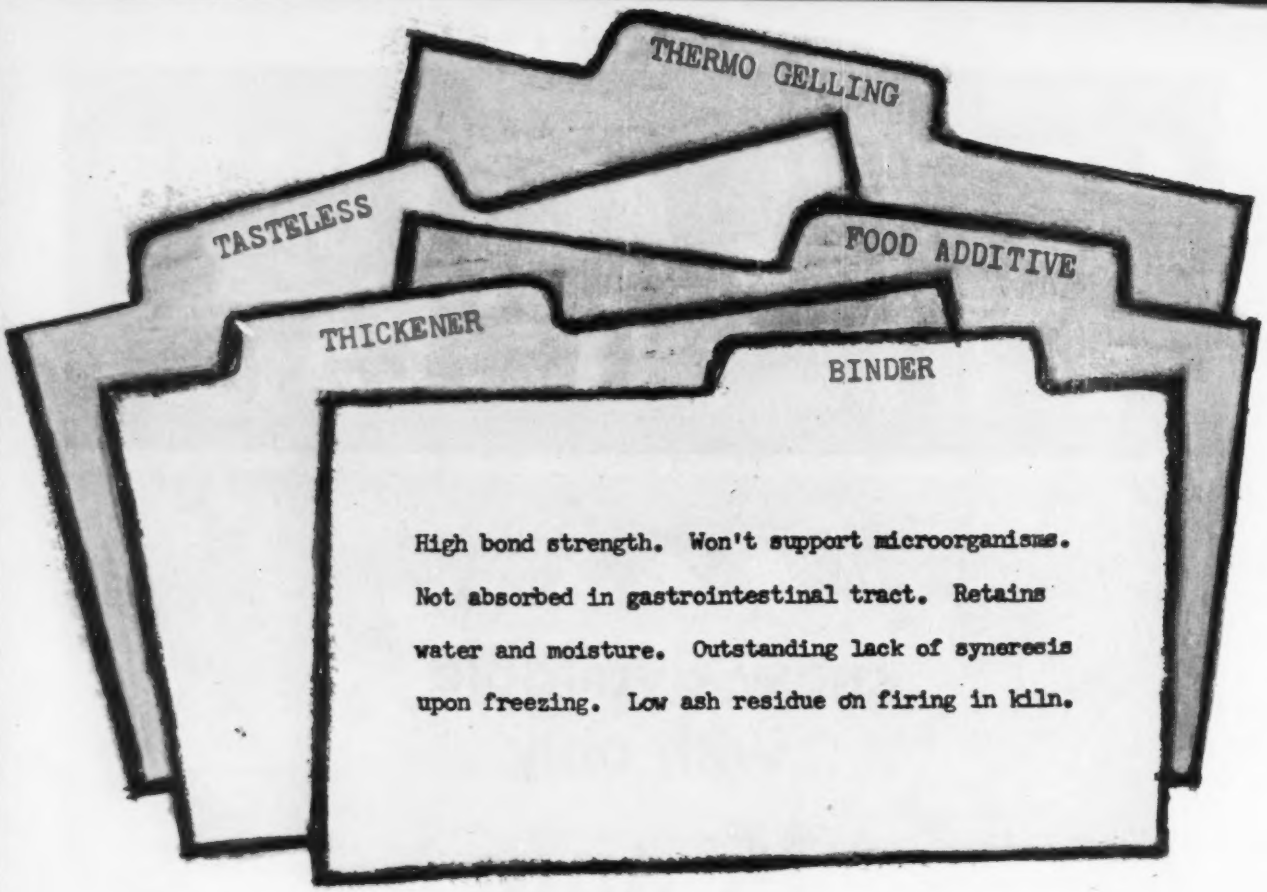
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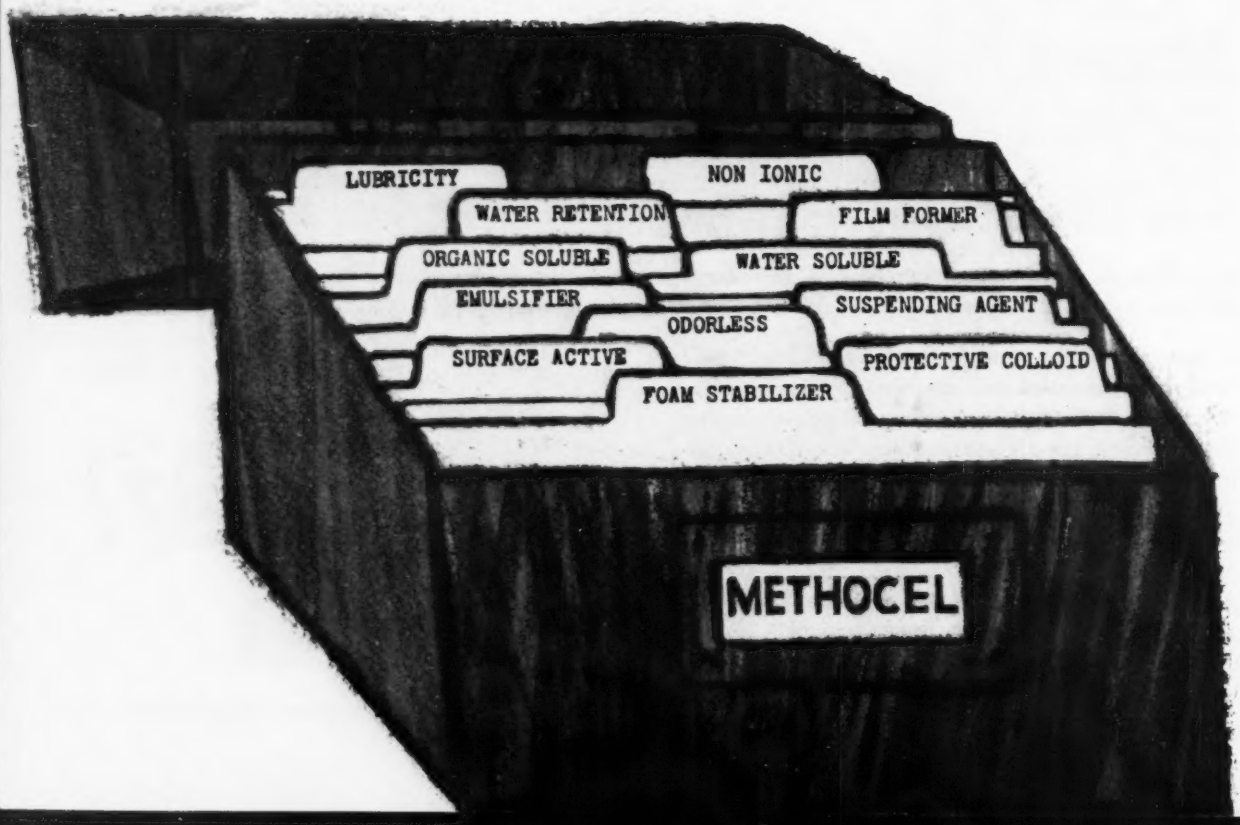

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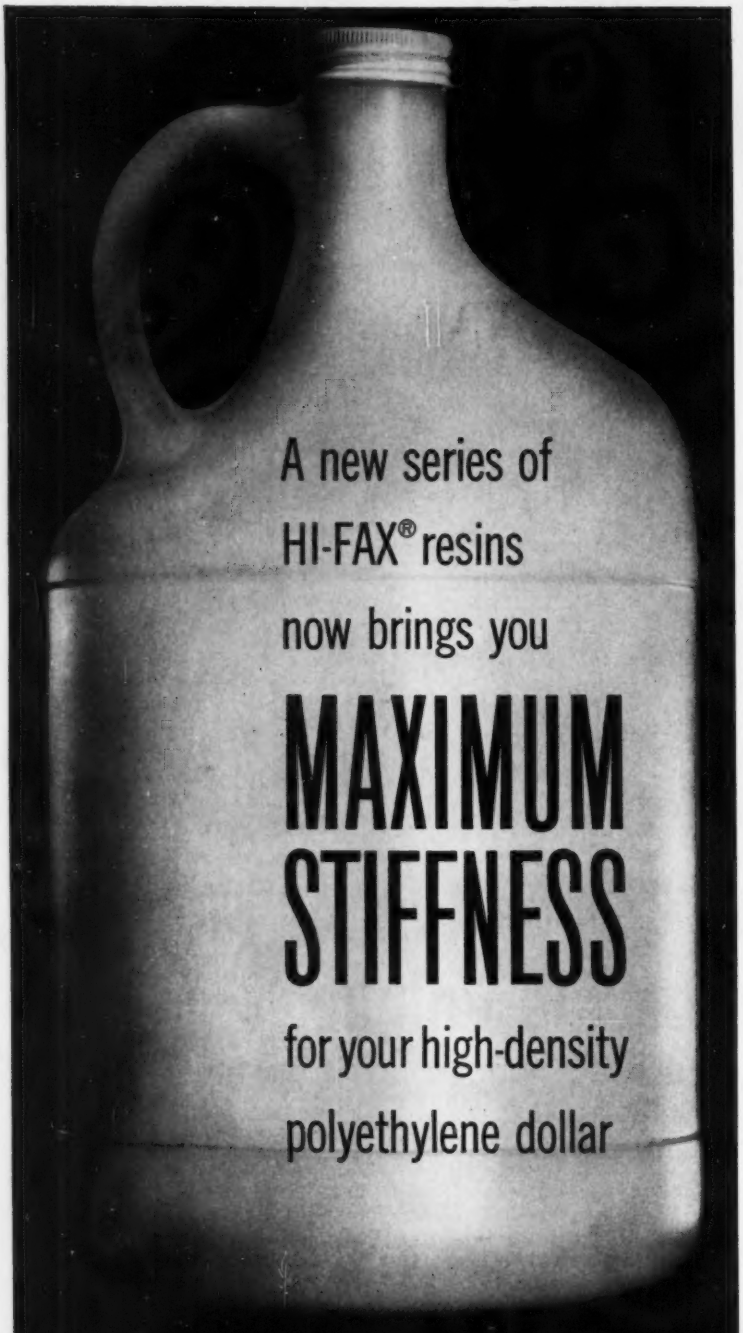

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CP61-9

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'(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin.'
From Executive Order 10925

CPI Takes Lead in Anti-Bias Drive

Led by companies most heavily involved in defense work, the chemical process industries are supporting the equal - employment - opportunity drive sparked by President Kennedy's Executive Order 10925.

Management's clearest show of support for Order 10925 will come within the next few weeks, when 50 or more companies will endorse a special "Plan for Progress" of the President's Committee on Equal Employment Opportunity (CEEO). This document, contents of which vary somewhat among companies, puts the signer on record as a foe of discrimination, specifies what the company will do with respect to employee recruiting, training, upgrading, and the like.

A number of CPI firms are among the signers. While they will not be officially identified until all endorsements are in, CHEMICAL WEEK has learned that Socony Mobil Oil Co., holder of $47.1 million in defense contracts in '60, will endorse the program. Standard Oil of California, Hercules Powder, and Thiokol are among companies* that have been invited to participate in the plan.

While many companies will comply with Order 10925 itself, there are some aspects of the program that puzzle both management and labor.

Letter of the Law: These aspects concern interpretation of the clause that must be put into all government contracts—and all the contract-holder's subcontracts—to the effect that discrimination regarding (but not limited to) "employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoffs or termination; rates of pay and selection for training, including apprenticeship" subjects the basic contract to cancellation.

Whether this provision has been violated will be determined largely by the President's Committee, which has appreciably more power than its predecessor, the Nixon Contract Compliance Committee, and the Truman counterpart before that. Both the CEEO chairman, Vice-President Lyndon Johnson, and its vice-chairman, Secretary of Labor Arthur Goldberg, have left no doubt that they intend to see that the order is enforced.

Room for Argument: The top 50 defense contractors and the 42 union leaders who met with the committee earlier this year assured the government that they have no basic objection to the anti-bias program. But the threat of enforcement by contract cancellation has resulted in privately voiced misgivings among some management men.

A Midwestern plant manager observes, for example, that his company

* In '60, CPI defense contract holders (in order of award size): General Tire & Rubber, Thiokol, Hercules, Standard of Calif., Texaco, Goodyear, FMC, Olin, Socony Mobil, Richfield Oil, Union Carbide, Continental Oil, Goodrich, Standard Oil of Indiana, Gulf Oil, Firestone, Vitro, Sinclair, Cities Service, Sunray Mid-Continent Oil.

CW PHOTO—JOAN SYDLOW

Carbide's Mahoney, Urban League's Allen consult on labor relations.

holds only a few direct government contracts. If one plant in his multiplant company, however, is held to be in noncompliance with Order 10925, the entire company (unfairly, he thinks) would be vulnerable to a disciplinary action and perhaps unfavorable publicity.

CEEO, on this score, has indicated that it prefers to work quietly and by persuasion in private dealings with companies. It is also taking the attitude that many members of minority groups are not now qualified for the better jobs that will be open to them; that apprenticeship programs will be a major interest of the committee.

Another executive worries about the cut-off point in purchase orders: "Do you include nondiscriminatory provisions in purchase orders for paper clips?" He also is uneasy about the fact that as a supplier of many chemicals his company cannot always be sure about their ultimate destination. They might, without the supplier's knowledge be used in government work, raising the question (in his opinion) of whether the supplier comes within the scope of the law.

The National Assn. of Manufacturers Law Dept. has analyzed the new rules and points out that, while the government holds the contractors responsible, it doesn't do the same regarding unions. There is the question of what management can do about an all-white union that resists a company's hiring of Negroes. The committee is authorized to call these unions into public hearing, however, and this may possibly cause them to conform. And unions themselves are giving the matter thought.

Easy Going: In Louisville, Ky., for example, representatives of an estimated 40,000 union members have gone on record in support of the new Citizens Emergency Committee for Integration.

Chemical plants in the Louisville area report little impact of the new executive order. One reason, according to Goodrich Chemical's plant industrial relations manager, H. P. McMath, is that the area's work force is down. Due to the recent pickup in business, workers who have been laid off have been recalled, but few, if any, new employees have been hired.

Goodrich and other chemical firms in the area regularly employ Negroes in white-collar jobs. "We have had an antidiscrimination policy for quite a few years," says the manager of another plant. "When we opened up job bidding in '56, the union took a very enlightened view, and we have had no problems at all."

Initiative: Long before the Administration became concerned about fair employment practices, many companies had initiated programs to eliminate bias.

For example, Union Carbide Corp., which has plants in all parts of the country, has been working with the National Urban League (New York) for more than 15 years to implement the company's non-bias policy.

Robert Mahoney, manager of the corporation's industrial relations development, recalls that in '58 the league's industrial relations director, Julius A. Thomas (now a consultant), and representatives of Union Carbide initiated a cooperative undertaking between the league's affiliates and Carbide's offices and plants. Mahoney meets frequently with Alexander Allen, associate director of the league and other league officials. (There are 64 local Urban Leagues in 30 states and in the District of Columbia.)

The league, incidentally, has similar arrangements with 35 multiplant corporations, including Goodyear, IBM, RCA, Socony Mobil.

Allen describes the league's function as "assisting industry in putting nonsegregation principles into practice."

The league is not an employment agency in any sense, although—in special cases—it does refer Negro applicants to potential employers.

"There are problems in opening white-collar jobs such as accounting and technical work to Negroes," Allen says. "There is frequently an informal but firm ceiling on jobs for Negroes above the common labor level."

For that reason the league is stressing training, and is particularly proud of its youth incentives program, which involves talks by outstanding Negroes in various fields (physicians, lawyers, chemists, etc.) before groups (frequently of mixed races) in public schools, community centers, settlement houses, and the like.

"Many young Negroes are demoralized because they believe they will have no chance to use special skills they may acquire," says Allen. "We point out that things are changing, and that they should obtain training in any field in which they have particular aptitude. We let them know that it can be done."

Chemical companies have a somewhat better race relations record than

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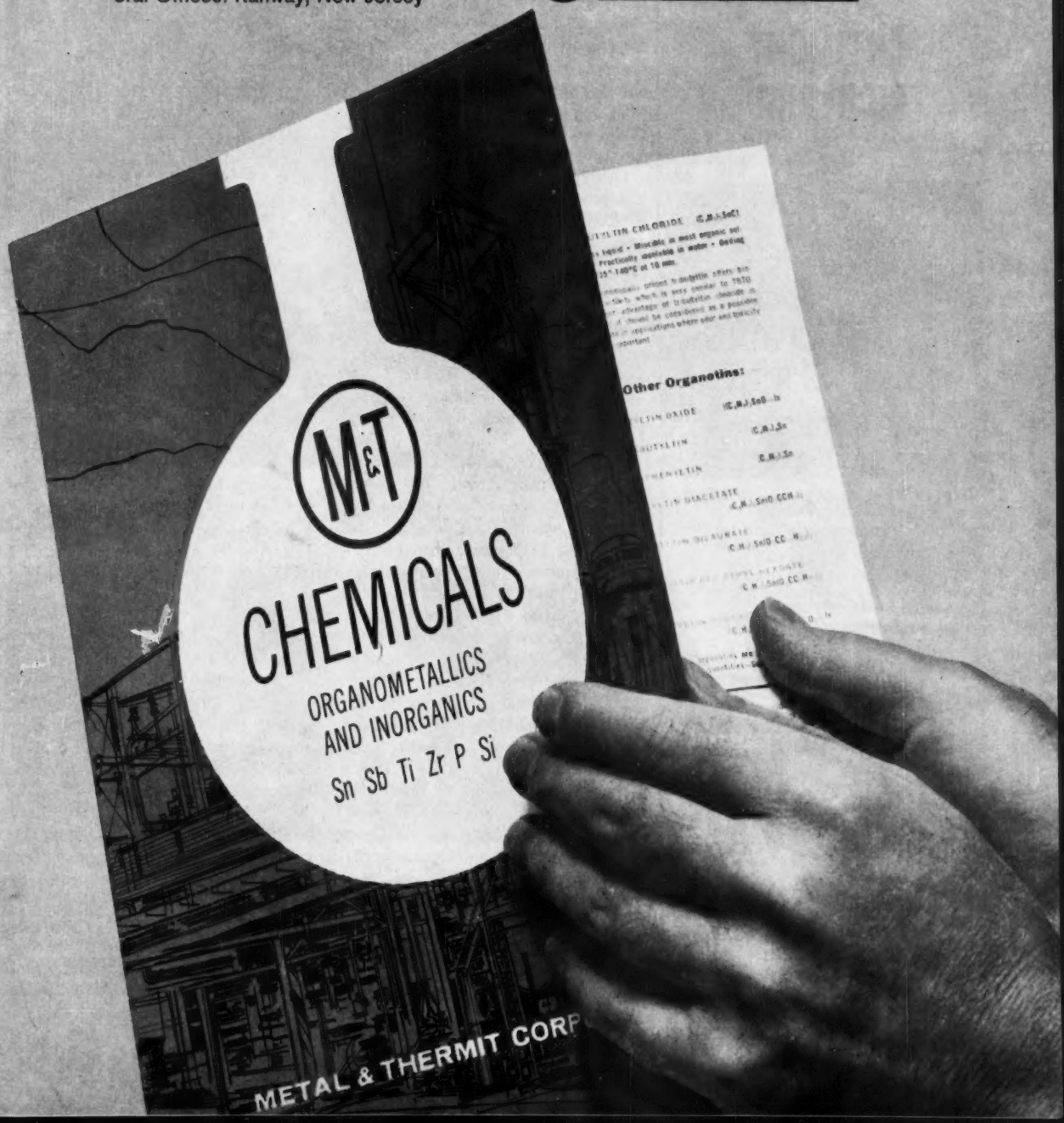

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most industries, in Allen's opinion. He notes that chemical process companies "do not have a long established tradition of discrimination in employment, are somewhat more receptive to new ideas than older industries, and have imagination."

Regional Attitudes: A nationwide CHEMICAL WEEK survey of CPI companies uncovered no serious disruptions as a result of the new executive order. Regional attitudes vary—from quick acceptance where integration has been a minor problem to individual hesitation where plants are located in metropolitan or other areas having a high concentration of minority groups (e.g., Chicago).

Several companies in the Houston area report there has been a lowering of employment barriers in the last five or six years. "It remains to be seen what the actual applications of the new ruling will be," says one company official.

California, one of the top 20 chemical producing states (*CW, Aug. 5, p. 103*), with 36,000 employees and more than $600-million output, in many ways typifies the national pattern of employment practices. There are sizable concentrations of many minority groups in the state, which has its own Fair Employment Practices Commission.

After almost two years of operation, about 900 complaints have been filed with the California FEPC against all segments of industry, including chemical firms. About 700 cases have been closed, either because the complaint was without substance or because the employer agreed to correct any inequities after conciliation talks with FEPC representatives. Only two cases could not be amicably settled; neither involved chemical firms.

"We employ people of all minority groups throughout our operations," says Fred Russell, personnel director of Standard Oil of California (Southern Division). "We have many Japanese and Chinese in the office, at the refineries, in the oil fields and at the service stations. The same is true of Negro employees—with one exception. We have no Negroes working in the oil fields, but the only reason is that Negroes seldom apply for these jobs.

"When we run into a situation where we think a supervisor is not giving an applicant or employee the consideration that ought to be given, I discuss the matter with the department manager. I point out the specific problem, and the department manager has a chat with the supervisor. This has worked effectively.

"The real problem for the Negro in this area is job qualification. In southern California, at least, I think people are ready to employ Negroes. But an employer is buying services, not simply complying with requirements of a law or an act or a committee. I'm a member of the Urban League, as was the man who preceded me in this job, and the problem of getting Negro youngsters to qualify themselves is one we're very much concerned with. There's no employment problem with Orientals because their philosophy has always been to push themselves through school, and they're generally qualified for the job that becomes available."

Who Applies? Thurston Ruby, manager of personnel and industrial relations at Shell Chemical Co., says that Shell rarely receives an application from a Negro chemist or chemical engineer. "But we do have Orientals working in these jobs," he adds. "And some of the very top positions are held by people of the Jewish faith." Shell's policy (predating the state's FEPC by many years) is not to discriminate against any applicant because of race, creed, color, national origin, ancestry, or membership or nonmembership in any labor group.

Labor's Look: About 6,000 members of the Oil, Chemical & Atomic Workers Union are employed in the Los Angeles area. Between 250-300 of the members are Negroes. The OCAW local is the bargaining agent at Union, Shell, Richfield, Texaco and several independent refineries.

Pat O'Malley, executive of the local, says: "We haven't had any problems in placing our Negro members, at least not for the reason that they are Negroes. Some are in the highest positions called for under the contract, and I believe one of the refineries has a Negro in a supervisory position. Of all the refineries where we represent the workers, only Texaco does not have Negroes employed at the plant. There are about 550 OCAW members in the bargaining unit at the Texaco refinery. But this does not mean that Texaco is discriminating. The fact is they haven't done

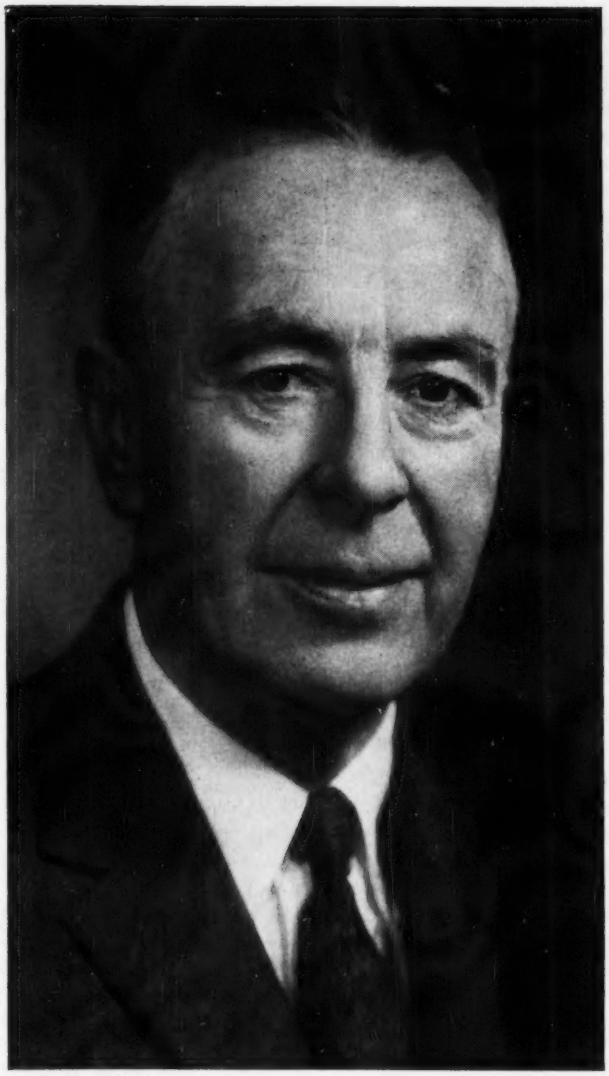

Photo by Fabian Bachrach

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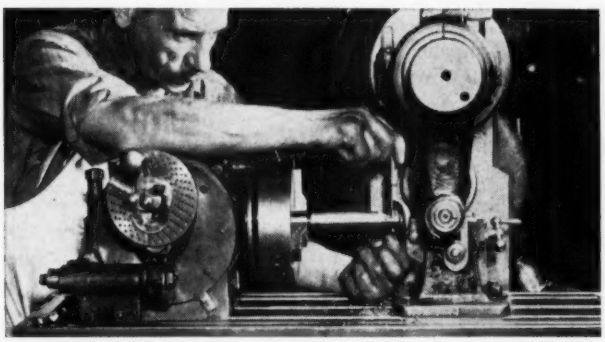

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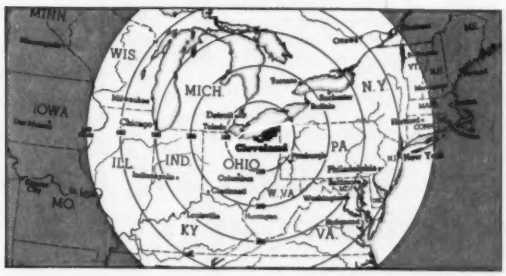

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any hiring of anybody in about the past four years."

Few Take the Challenge: Ike Adams, labor chairman of National Association for the Advancement of Colored People (Los Angeles), reports, "We get complaints from almost every conceivable field, but very few that involve the oil or chemical industries. We haven't filed a blanket complaint against any oil or chemical company in the last five or six years. On the skilled and professional levels, though, our people who might fit into these companies often don't even bother to apply. Most Negro chemists, for instance, prefer to go to work in medical laboratories or for state, city, or federal governments."

Adams isn't sure of the value of excluding information about race on application forms, thinks this practice makes it difficult for employers to get statistics. And a man's race can often be determined on the basis of other information—e.g., address, societies—appearing on the form.

Progress that has been made by more highly skilled Negroes has been due primarily to government contracts, comments Preston Taylor, vocational services secretary of the Urban League of Los Angeles. "You'll find that in defense industries there are more equitable proportions of Negroes than in other businesses," he adds.

Case History: Dermont "Duke" Cromwell is Negro. He is chief chemist of the architectural division of Sinclair Paint in Los Angeles and has been with Sinclair for 11 years. He had been a chemist for I. F. Laucks, Ltd., remaining on after the firm was merged into Monsanto. He held that position for a total of seven years.

A graduate of Wilberforce University (Ohio) with a B.S. degree in chemistry, Cromwell considers himself lucky to be working as a chemist. "A few months ago," Cromwell wryly recollects, "a friend of mine, who graduated from Wilberforce in chemistry at the same time I did, told me he had been turned down by the oil industry, the chemical industry and the aircraft industry. He said to me, 'I often wonder what I went to school for.' He's working as a fireman now."

Another friend of Cromwell was hired as a chemist several years ago by the Air Pollution Control District. But for 12 years prior to that, despite a master's degree from the University of Michigan, he had not been able to find employment as a chemist.

Cromwell says that when he joined Laucks he was hired on the basis of a two-week trial period "to see if I would fit in." In '50, when Monsanto sought to establish a phenolic and urea resin plant in Santa Clara, Cromwell was one of the company's most experienced chemists in this field. Nevertheless, he claims, he was denied transfer to an executive position with the Santa Clara plant "because they though I wouldn't fit in." Since that time, Monsanto has hired Negro chemists, but Cromwell feels that industry, as a whole, still clings to the attitude that the Negro "won't fit in."

I've fit in everywhere I've been," says Cromwell. "And they tell me, 'But, Duke, you're different.' If management could get over its fear about what someone else is going to think, they'd find there isn't any problem about the Negro fitting in.

"Of course, when they say they can't find qualified Negroes, that's a stopper. Many Negroes don't go into industry. I think part of the reason is the direction they get in school. They're steered into the fields of least resistance—teaching, social sciences, and civil service.

"If Negroes are going to take a more important part in the chemical industry or any other industry, it has to come about in three main steps: (1) the Negro has to prepare himself better, through schooling; (2) he will have to normalize his attitude in job seeking, get the chip off his shoulder; (3) industry has to liberalize its attitude to give the Negro a chance. It can't use the excuse of 'lack of qualification' forever.

"One lesson I learned is that you can't hire on a basis of race. When I first came to Sinclair I thought, 'Now I'm in a position to hire, and I can give some colored boys a chance.' And I hired three colored boys in a row, more on the basis of race than on their qualifications. None of them was able to cut the mustard. Since then I've considered only a man's ability or his potential, and the Negroes I've hired and who are on the payroll now are there because they

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1. *The Thiocyanate group* can be introduced into many organic compounds by reaction of ammonium thiocyanate with the corresponding halide.
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4. Some amine salts react with ammonium thiocyanate to give the corresponding *amine thiocyanates;* some yield the corresponding *thioureas.*
5. Ammonium thiocyanate can be reacted with: Dicyanadiamide to yield *guanidine thiocyanate;* Nitrites to yield *amidines;* Acyl derivatives of a-amino acids to yield *2-thiohydantoins.*

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BULLETINS AVAILABLE

Baker Product Data Bulletins on ammonium thiocyanate provide valuable information about its many industrial applications. Bulletin 102 is a research report on ammonium thiocyanate as a corrosion inhibitor for nitrogen solutions. Bulletin 101 gives data on general properties and uses. We will be happy to send you either or both bulletins as well as price information.

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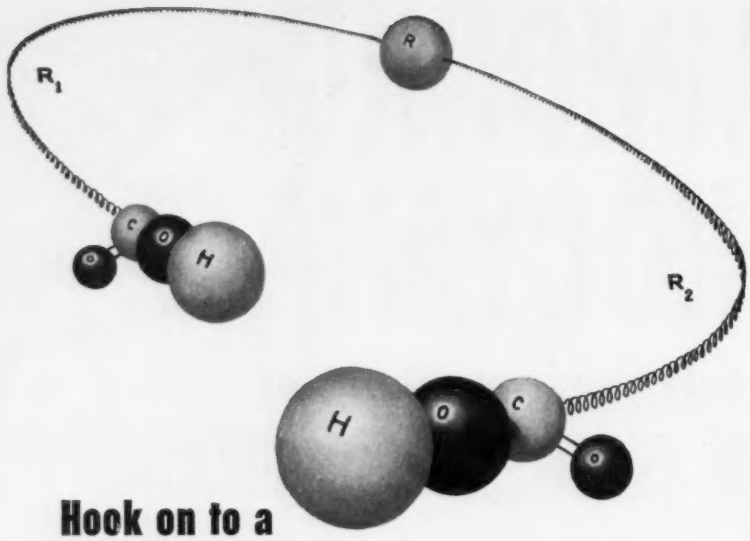
Phillipsburg, New Jersey



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really have it on the ball and for no other reason. Maybe industry could learn that same lesson from the other side of the fence."

In the U.S. one out of every 10 workers is a Negro. About 32% of Negro workers are concentrated in service jobs (compared with 10% of white workers). The white vs. Negro figures are 4.6 vs. 15.4% in unskilled work; 22.5 vs. 7.4% in clerical and sales; 11.6 vs. 4.4% in professional and technical fields

By '70 the U.S. work force will include 10.4 million professional and technical workers, compared with somewhat more than 7 million today. The number of clerical and sales workers will climb from 14 million to nearly 18 million in the same period. No appreciable increase is expected in the unskilled force, currently nearly 4 million.

Meanwhile, the Negro population is rising 57% faster than the white, and represents a purchasing power of nearly $20 billion. Boycotts by Negroes against companies have stimulated employment of members of their race. New laws, a changing sentiment in industry and educational drives are expected to do the same.

KEY CHANGES

George W. Sarti to vice-president in charge of Southern operations for Crown Chemical Corp. (Providence, R.I.).

James M. Tuholski to president (Mead Johnson Laboratories), **Warren M. Cox** to vice-president (Nutritional Research, Mead Johnson Research Center), **Howard R. Alexander** to vice-president (Product Development, Mead Johnson Research Center), Mead Johnson & Co. (Evansville, Ind.).

Richard C. Wells and **Thomas R. Vaughan** to members of the board of directors, Freeport Sulphur Co. (New York).

James R. Dudley to president, Treplow Chemical Co. (Paterson, N.J.), subsidiary of Richardson Co.

Jeff D. Collins to vice-president and director of sulfur sales; **Bradlee V. Postell** to vice-president and director of corporate development and expansion, Jefferson Lake Sulphur Co. (New Orleans).

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Armoflo compounds may be applied as received, by spraying, dripping or fogging onto the product while it is tumbling in rolling or blending equipment. Armoflos coat each particle with a monomolecular layer that changes hygroscopic surfaces to hydrophobic. They will withstand product heats up to 325° F. and are stable in storage for long periods. Armoflo compounds also provide virtually complete corrosion inhibition for iron and steel processing equipment.

A smoother, faster, more even flow of product results when Armoflos reduce friction between particle surfaces. This lubricating action reduces abrasion and thus reduces "fines" and dust formation.

Armoflos are now being used commercially with a number of products and current testing indicates many more potential applications. The versatility of Armoflo compounds is demonstrated by the following three categories of materials.

FERTILIZERS

Armoflo compounds are effective conditioners for all types of mixed fertilizers —low as well as high analysis grades. The compounds act as anti-dusters on low analysis grades and as anti-dusters and/or anti-cakers in high analysis grades. Armoflos are being used effectively as anti-dusting and anti-caking agents on these typical grades:

Anti-caking and Anti-dusting of High Analysis Grades	Anti-dusting of Low Analysis Grades
0-20-20	0-20-0
5-10-5	3-12-12
5-20-20	3-9-18
7-21-21	3-9-27
7-28-14	4-12-8
10-10-10	4-12-12
12-12-12	5-40-0
15-15-15	8-8-8
17-7-0	10-6-4

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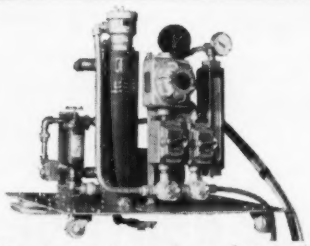
- Diammonium phosphate (21-53-0 and 16-48-0)
- Manure salts
- Monoammonium phosphate
- Nitrate of lime
- Potassium chloride
- Potassium nitrate
- Potassium sulfate
- Sodium nitrate
- Urea (prill & crystal)

OTHER MATERIALS

Armoflo compounds likewise do an effective job of helping prevent caking and dusting of various inorganic and organic materials. They function well across a wide pH range from acidic to highly alkaline. The materials listed below, as well as similar products, can be successfully conditioned.

- Caustic Soda
- Detergents
- Dextrin-urea blends
- Fluorspar
- Glues (mixed, powdered)
- Guar gums
- Hypochlorites
- Insecticides
- Magnesium oxide
- Metallic soaps
- Pentachlorophenol
- Rock salt
- Sodium bisulfate
- Sodium chlorate
- Sodium metasilicate
- Sulfur
- Sylvite
- Thermosetting plastics
- Zinc chloride



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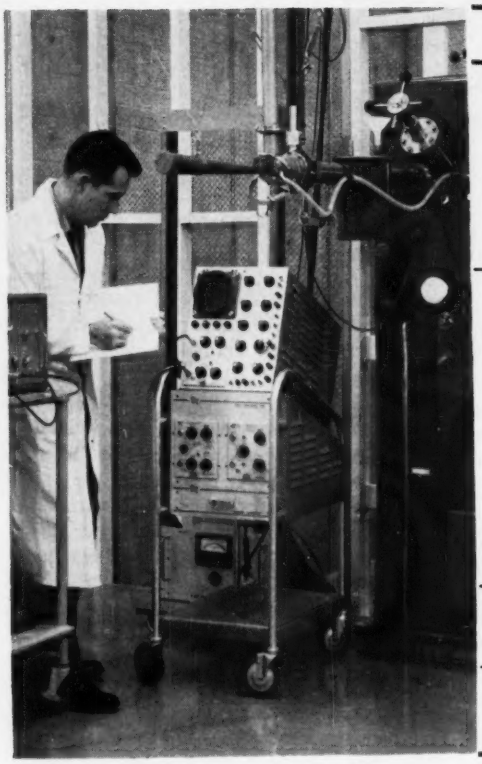
CHEMICALS DIVISION Olin

Promising Applications for Accelerators



Process	Status
Cross-linking	
polyolefins	**Production**
polyvinyl chloride (promoted by allyl ester)	**Development**
polyester curing	**Development**
rubber curing	**Development**
silicones curing	**Pilot plant**
Grafting	
styrene on polyolefins	**Pilot operations**
acrylonitrile on polyolefins	
acrylamide on polyolefins	
styrene on fluorocarbons	**Some production**
acrylonitrile on polymethacrylates	**Development**
acrylonitrile on polyvinyl chloride	**Development**
acrylonitrile on rubbers	**Development**
methacrylic acid on polyamides	**Pilot plant**
methacrylic acid on polyesters	**Pilot plant**
vinyl acetate on cellulose acetate	**Pilot plant**
Sterilization	**Production**
Food preservation	**Development**

Radiation Machines Go Job Hunting

Radiation-producing particle accelerators are moving out of the realm of strictly basic research into product and process development work—even some production applications.

Bearing this out: (1) High Voltage Engineering Corp. (Burlington, Mass.) is readying its new production-oriented electron accelerator for shipment to an undisclosed chemical company; (2) last week a symposium on industrial uses of accelerators sponsored by Radiation Dynamics, Inc. (Westbury, N.Y.), drew a host of chemical researchers; (3) General Electric Co.'s X-ray Dept. (Milwaukee) has just closed sale of industrial accelerators to Toyo Rayon Co. and Kurashiki Rayon Co. (both of Osaka, Japan).

Thirty-Year Growth: Since the invention of a "primitive" type of accelerator called the cyclotron three decades ago, hundreds of accelerators have been used for basic research. They provide a direct source of radiation. By bouncing electrons and posltive ions (e.g., protons and deutrons) off targets, the accelerators can produce X-rays and neutrons, and thus provide a gamut of energy emissions.

Researchers quickly learned that accelerators could do a variety of jobs —e.g., chemical catalysis, polymerization, sterilization—but in most cases it is more costly to do this work with the accelerator than by conventional means.

In two specific operations, however, cross-linking of polyethylene and the sterilization of certain medical items, accelerators have won commercial jobs. GE's Insulating Materials Dept. (Pittsfield, Mass.), Raychem Corp. (Redwood City, Calif.), Johnson & Johnson's Ethicon subsidiary (Somerville, N.J.) and Japanese firms are among the few companies that have put accelerators into production lines. Many other firms contract for time on manufacturers' equipment — just as firms buy time at computer service centers. For example, Radiation Dynamics runs one of its Dynamitrons almost 24 hours/day on a variety of customer jobs. And at High Voltage Engineering, a service center offers a choice of a few different accelerators for all kinds of contract work.

New Tool: High Voltage's new production-line accelerator is finding its first job in curing a plastic, according to Robert Van de Graaff. (He would not say where or for what purpose.) The device is an insulating core transformer (ICT) accelerator, which is simple, compact and can develop high voltages. Unlike conventional units, its novel transformer has a segmented magnetic core with insulation between successive segments. High voltage can be built up in the secondary windings

Kennard Morganstern of Radiation Dynamics eyes industrial market.

High Voltage's Robert Van de Graaff, pioneered the accelerator field.

GE's Thomas Workman has been concentrating on plant accelerators.

of each segment without the need to insulate between the ending and the core. The company claims that this is a limitation of conventional transformers.

Also, the device has three beams for emitting electrons or positive ions. Three separate production lines can be irradiated simultaneously.

Radiation Meeting: At Radiation Dynamics' symposium last week chemical processors were particularly interested in solid-state polymerization and the effects of radiation on alloys.

George Adler of Brookhaven National Laboratory (Upton, N.Y.), who talked about polymerization of solid-state monomers, has done extensive work on acrylamide. He cites one somewhat unusual feature of radiation-initiated polymerization on that material: linking, he says, continues long after the product is removed from the radiation source.

In studies keyed to basic understanding of metal and alloy behavior, A. C. Damask, also of Brookhaven, has demonstrated that nuclear-particle bombardment of metals can displace atoms from their original position in the crystal. This leaves vacant sites in the lattice structure. Since in a large class of metals and alloys the rate of atomic interchange is proportional to the number of vacancies present, this suggests a valuable way to speed the alloying process.

Because the number of atoms displaced for each accelerated particle is known, the alloying process can be controlled by regulating the kind and number of particles emitted. Pointing up the efficacy of particle bombardment is work on a "research" alloy of copper and zinc: α-brass. Its equilibrium state was reached in four hours of electron bombardment at 50 C. By thermal means alone, the period of time required to achieve equilibrium is calculated at 30,000 years.

Potent Potential: Aside from the research reported at the symposium, accelerator uses in almost every area of chemical reaction are under study. Radiation of polymers (other than polyethylene) has drawn research attention. Usually, this work shows, the result is a graft polymer, often with properties superior to those of the original material. For example, moisture pickup and dyeability of synthetic fabrics can be improved—and only brief radiation exposure is needed (compared with that required to cross-link polyethylene).

Among the useful changes induced by radiation: Mylar can be laminated and printed upon after radiation exposure; Pennsalt's Kynar polyvinylidene fluoride can be given almost nylon-like rigidity. This rigidity, in combination with its chemical resistance, puts it in a position to compete with Teflon, says Radiation Dynamics.

Hopeful Uses: Phillips Petroleum, Shell, Gulf and Socony Mobil are four of the oil companies investigating irradiation as a means of gas cracking and petrochemical manufacture. So far, however, irradiation is too costly for these jobs.

And cost is also the rub in using irradiation to upgrade rubber latex. Goodyear Tire & Rubber's T. C. Gregson and T. H. Rogers said at a recent technical meeting that irradiation imparts to the rubber better storage properties and makes a latex that produces a superior foam rubber. But by adding chemicals the same effect can be produced and at slightly lower cost.

Food Savers: Irradiation of food is another potential application for accelerators. At the Army's Headquarters Quartermaster Research & Engineering Command (Natick, Mass.), a new six-year study is getting under way. A new accelerator (and isotopes, which are also readily available radiation sources) will be installed at the research center in second-half '62. Object: to use radiation to totally sterilize food and make it safe for long-term storage.

The Atomic Energy Commission is conducting its own program on low-level radiation to improve the shelf-life of food for civilian consumption. As part of this program, Stanford Research Institute (Menlo Park, Calif.) has received an AEC contract for research on food irradiation.

The Cost Picture: In research on these radiation applications accelerators as well as other sources of radiation—e.g., cobalt-60—have been used. Which source gets a job depends on cost and ease of operation.

An average cost for accelerator irradiation is currently about \$1/kilowatt-hour of delivered energy. Manufacturers are trying to get this down to about 50¢/kwh., says GE's Thomas

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ACCELERATORS FOR INDUSTRIAL USES

Manufacturer	Energy Rating* (mev)	Power Rating* (kilowatts)	Type
Applied Radiation Corp., subsidiary of High Voltage Engineering Corp. (Walnut Creek, Calif.)	15	10	Linear
General Electric Co., X-ray Dept. (Milwaukee, Wis.)	2	10	Resonant Transformers
High Voltage Engineering (Burlington, Mass.)	4 0.5	4 15	Van de Graaff Insulating core transformer
Radiation Dynamics, Inc. (Westbury, N.Y.)	3	30	Dynamitron
Varian Associates (Palo Alto, Calif.)	60**	18**	Linear

* In million electron volts. Maximum values of industrial importance are shown. High Voltage has several models with higher ratings for research. Other firms making research accelerators are Texas Nuclear (Austin, Tex.), Hughes Aircraft Co. (Culver City, Calif.).
** Includes high-powered models for research purposes.

ACCELERATOR GLOSSARY

Dosage The amount of radiation energy supplied per unit mass of irradiated material. Expressed in megarads.

Energy Expressed in million electron volts, 1 mev is equivalent to the kinetic energy acquired by an electron accelerated across a potential of 1 million volts.

Power Expressed in kilowatts, accelerator power equals energy (mev) multiplied by the average beam current (milliamperes).

ACCELERATOR TECHNOLOGY

Microwave linear accelerator ("linac") delivers "pulsed" radiation. First, a series of current pulses, each of a few microseconds' duration is created; frequency is up to about 500 pulses/second. The result is a traveling wave that is driven down an evacuated path. Electrons fired into the moving wave are trapped by electromagnetic fields characteristic of the wave and are accelerated to the speed of the wave itself.

Resonant transformer is an outgrowth of high-voltage X-ray technology. The need for an iron core is eliminated as a secondary or high-voltage circuit on the X-ray transformer is tuned to resonance.

Electrostatic (Van de Graaff) accelerator delivers a constant electron beam of uniform energy. A high accelerating voltage is developed by carrying an electrostatic charge to an insulated high-voltage terminal via a rapidly moving belt. Electrons are accelerated through an evacuated tube, which has a potential difference between the high-voltage terminal and the lower end of the tube.

ICT (insulating core transformer) accelerator has evolved from conventional transformers. The key is the segmented, insulated core, which permits the buildup of high voltages.

Dynamitron, patented by M. R. Cleland of Radiation Dynamics, Inc. (U.S. 2,875,394), converts ac. to high-voltage dc. by means of a cascaded rectifier system. A comparatively large electron-beam current is attained.

Cockroft-Walton and the Capacitron units are variations that may have industrial applications. Other larger accelerators are still made on a "do-it-yourself" basis strictly for research applications.

Workman, and they realize that the CPI needs a 10-25¢/kwh. cost before wide application developed. Devices to provide this are just coming onto the horizon.

Direct comparison of accelerator radiation with that of cobalt-60 involves several operating factors. For example, cobalt-60 radiation is emitted in all directions, while an accelerator emits in one direction. And action of an accelerator, unlike a constantly emitting cobalt-60 source, can be stopped by cutting off power. Differences such as these figure into choice of radiation source and process design.

One quick comparison of accelerators and cobalt-60: the price of cobalt-60 is about $1/curie (a unit that doesn't involve exposure time). And 70,000 curies are equivalent to 1 kw. from an accelerator. However, the choice of radiation source is involved and should be carefully detailed.

Comparing Accelerators: There are about a half-dozen varieties of industrial accelerators (*see tabulation, left*), but no general agreement on how to classify them. For example, radiation physicists distinguish between electron and positive-ion accelerators—those that emit heavier particles—although certain of the industrial electron devices can easily be converted to emit heavy positive ions.

Since an accelerator for commercial use may be directed at one job, it is often cheaper and less powerful than a more versatile research accelerator. Prices of the installed industrial devices are $100,000-300,000, compared with a wide range of research accelerator prices (sometimes five times as high, sometimes lower).

When shopping for an accelerator, a CPI firm necessarily deals on a costing basis. The various cost factors include capital cost per rated kilowatt, cost per installed kilowatt, and cost per kilowatt-hour. However, the fundamental criterion for choosing one accelerator over another—or for choosing an accelerator instead of another means of irradiating or no irradiation at all—is the total cost of making a pound of product in a given time.

Outside the U.S. Japan's Toyo Rayon and Kurashiki Rayon, which bought GE accelerators, have shown intense interest in radiation chemistry. Toyo Rayon developed its own acetal resin process using a 1.3-million-elec-

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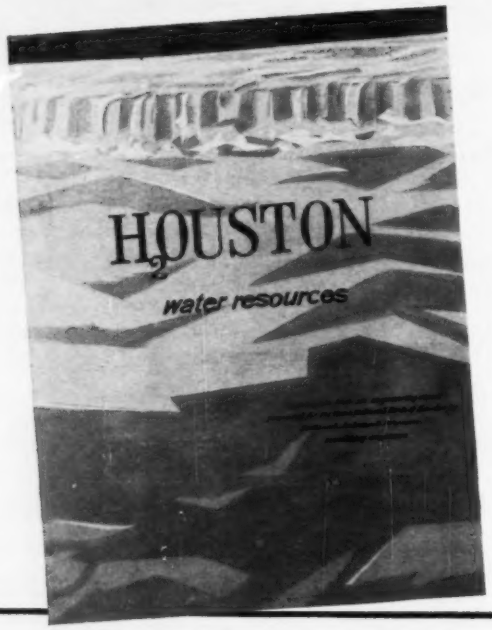

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tron-volts (mev) Van de Graaff accelerator (*CW, July 29, p. 45*).

European firms, too, have been good customers of U.S. accelerator manufacturers, and France's Société Anonyme de Machines Electrostatiques (Grenoble) has successfully sold devices of its own design.

Canada, which has four Van de Graaff accelerators in research operation now, has just signed up for its first linear device. It will cost $750,000, plus a $500,000 installation charge.

Work in foreign countries parallels that done in the U.S. For example, David Rowatt of the Atomic Energy of Canada Ltd. has been working on the grafting of synthetic fibers by means of radiation. And in England there have been recent advances in the use of radiation to sterilize meat and vegetables and for pharmaceuticals.

Research Accelerators: In the U.S. the use of accelerators for research work is getting a big boost. A Congressional appropriation for a giant linear accelerator to be built at Stanford University was made last month (*CW Washington Newsletter, Sept. 30*). The two-mile-long electron accelerator will cost $114 million, is due in operation within six years. This is, of course, far more powerful than any accelerator within reach of industry—its output is in the 20-billion-electron-volts (bev) range.

One of the largest units currently being installed, according to Kennard Morganstern, president of Radiation Dynamics, is a 1-mev positive-ion accelerator. It's going in at the Langley Research Center of the National Aeronautics & Space Agency.

The Outlook: A complicating factor in the industrial accelerator scene is the recently issued patent to Electronized Chemical Corp. (Brooklyn), a subsidiary of High Voltage. The parent company says that the patent (U.S. 2,981,668) covers the broad field of irradiating polyethylene (*CW Technology Newsletter, July 8*). High Voltage has not yet decided how—or if—it will try to demand patent licenses; indications to *CW* are that any such move would be strongly contested.

Even apart from the complication of a patent squabble, commercial application of accelerator-induced radiation will not be a sudden thing. Cost

alone is sufficient handicap. But with improved devices and research-refined techniques of using them, the chances for increasing commercial application of accelerators are good.

EXPANSION

- A new laboratory to house Du Pont's mechanical research activities will be built at the firm's Experimental Station near Wilmington, Del.
- A new, $200,000 research center, has been completed at the plant of Lakeside Laboratories, Inc. (Milwaukee). Research and new-product development will be carried out in cardiovascular diseases, gastrointestinal ailments and mental illness.
- Bituminous Coal Research, Inc. (Pittsburgh, Pa.) will begin consolidation of its Columbus and Pittsburgh activities at its new research center in Monroeville, Pa.
- Rheem Manufacturing Co.'s Container Division (Linden, N.J.) has opened a new research and technical service center at its headquarters. Work will center on new processes and techniques for the application of interior and exterior container coatings.
- Biddle Sawyer Corp. (New York), chemical importer and distributor, formed a new division, called Enzyme Development Corp., for research, manufacturing and marketing enzymes and enzyme preparations.
- A new company, Kleber Laboratories, Inc. (2530 North Ontario St., Burbank, Calif.), has been formed, according to Eugene Kleber, the founder of its predecessor, Research Chemical, Inc. The new firm will prepare and research high-temperature materials, based on the rare earths, and it will make instrumentation for the detection and analysis of beryllium and other light metals.
- The Industrial Instruments Division of Barber-Colman Co. opened its second gas chromatography research center at Rockford, Ill. The first, located in Houston, concentrates on chromatography in petrochemicals and chemicals, while the new laboratory will specialize in the medical and biochemical fields.
- Semi-Elements Inc. (Saxonburg, Pa.) is expanding its work in single-crystal production with a program on nickel sulfate hexadrate. A new laser crystal facility has been set up.

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Write for Data Sheet or Consult Chemical Materials Catalog Page 179 for further data.

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Market Newsletter

CHEMICAL WEEK
October 21, 1961

Polypropylene films makers are aiming sales pitches straighter into cellophane's area of the packaging market—something of a departure from the more customary price/property scrimmaging that has up to now been more noticeable between polypropylene and polyethylene films.

Apparently some PP film makers believe they are now in a position to make a more direct plunge into established cellophane territory. For example, when Cryovac Division of W. R. Grace last week revealed its new, shrinkable biaxially oriented PP film (called Cryovac Y film), the firm made direct reference to the product's "exceptionally clear and glossy appearance, which matches that of cellophane."

Somewhat more of an end-run was the price comparison: Y film can be used in thinner gauges than "most" packaging films; as a result it is "one of the most economical of all overwrap materials." Cryovac says Y film prices will range from 2¢ to 2.8¢/1,000 sq.in., depending on gauge, coatings and type of winding.

This price compares with 1.81¢/1,000 sq.in. that AviSun posted on its new, 0.87-gauge polypropylene film (aimed largely at bread-wrap uses) a few months ago (*CW Market Newsletter, July 1.*)

•

Cellophane makers are also getting into film price maneuvering. Last week Du Pont revealed it had cut the price of "K" cellophane 250-201 by 5¢/lb. bringing the tab down to 74¢/lb. (2.96¢/1,000 sq.in.) from the previous 79¢/lb. Other cellophane film makers quickly followed suit with similar reductions.

The price cut obviously strengthens cellophane's competitive position against polyethylene and polypropylene films; but Du Pont spokesmen are clearly loath to advertise growing importance of competing materials, deny polyolefin competitive pressures had anything to do with the price cut. Official reasons: savings from increased and improved manufacturing operations, "bigger than expected" sales volumes.

Only the one cellophane material was price cut ("K" cellophane 250-201 was introduced last spring and Du Pont says consumption for bread packaging is already at a 4-million-loaves/year rate). "K" cellophane 195-203 remains at 79¢/lb. and cellophane 220 MSD-60 remains at 62¢/lb. These three films were touted a few months ago as Du Pont's new, high-yield cellophane materials (*CW Market Newsletter, July 1.*)

•

Relative prices of comparable cellophanes and polyolefin films represent only one aspect of the over-all competitive picture. Other important hurdles for polyolefin film marketers: Selling users on the feasibility of either converting existing packaging equipment to handle the new films or modifying polyolefin film properties to fit requirements of equipment now used to wrap with cellophane.

A shortage of elemental sulfur may develop by '65 or '70, Vice-President H. W. Manley of Jefferson Lake Sulphur contended last week at the Petroleum Accountants Society meeting at Calgary.

Manley (who is also vice-president of Jefferson Lake Petro-Chemicals of Canada) accused "certain competitive 'Frasch' sulfur producers" of making "malicious" statements with respect to "surplus sulfur." Manley said Canadian sour gas sulfur producers are ill-advised to adopt give-away marketing policies because of such talk. What is needed, he added, is the practice of self-restraint and use of orderly marketing sales procedures.

Manley forecast Canadian-recovered sour gas sulfur production of about 3.5 million tons/year by '72. He put world demand for this type of sulfur "conservatively" at almost 15.1 million tons by '70, 6.23 million tons more than in '60.

•

Europe's chemical industry may get its own market research association. Twenty-five representatives of chemical firms in seven countries probed the possibility—and appeared to like the idea—at a Paris luncheon given last week by Roger Williams Technical & Economic Services, Inc. (Princeton, N. J.). A follow-up meeting, open to all interested in European market research, is scheduled for Jan. 16, '62, in London.

•

Pfizer Canada's oxalic acid output isn't stemming flow of imports into Canada significantly, although the firm has been marketing the acid since May '60. Oxalic imports in Canada—1.2-1.6 million lbs./year in '58-'60—still exceed 1 million lbs./year.

Pfizer can try for more oxalic markets two ways: (1) have Canada's Tariff Board propose a rate change from the present 0-7½% to 15-20%; (2) use some oxalic to make ammonium, ferric potassium and ferric sodium oxalates. Either tactic would take time.

Citric acid also poses rough marketing problems for Pfizer Canada, mainly because Monsanto's made-in-Canada fumaric acid is moving into the food acidulant field.

Until now the 4-5-million-lbs./year food-grade acidulant market had been divided between Pfizer's Kemball Bishop subsidiary (Cornwall) and Sturge (Valleyfield). Neither has sufficient volume to carry out basic fermentation in Canada (although Pfizer says it will do so in the not-distant future); both import calcium citrate for starting material.

Meanwhile, both Sturge and Pfizer are concerned about a citric acid price cut made by an important European exporter and are asking Canada's Tariff Board for an increase in rate to 20% (British Commonwealth preferred) to 25% (most favored nation).

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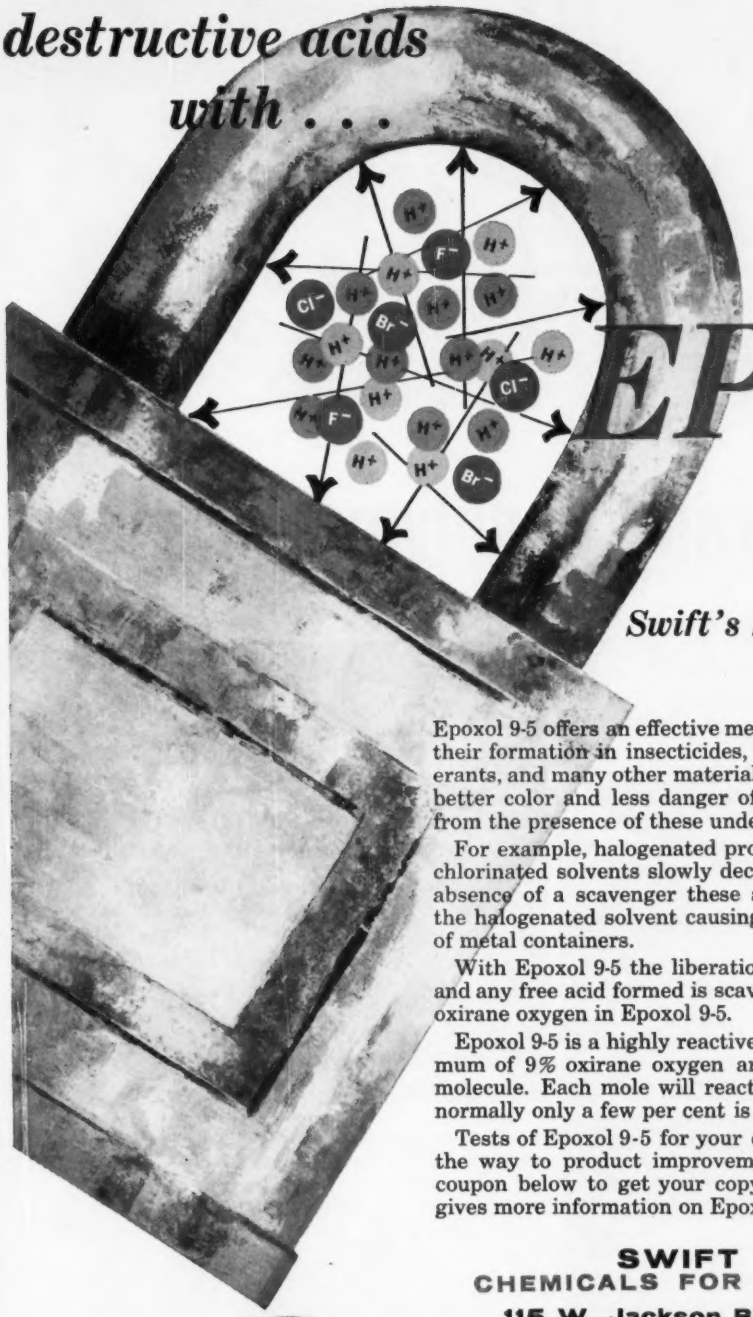

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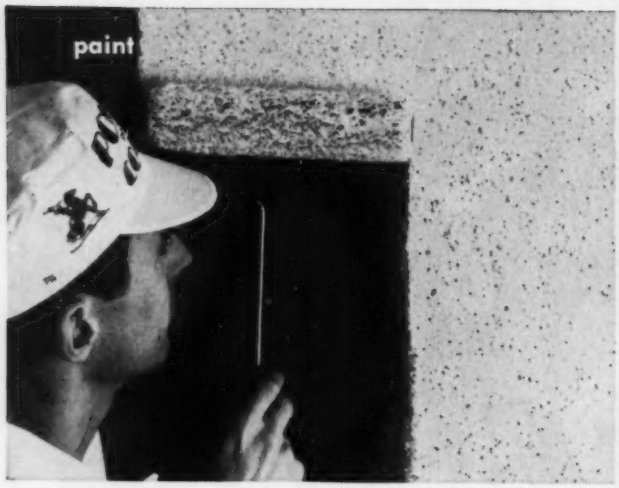

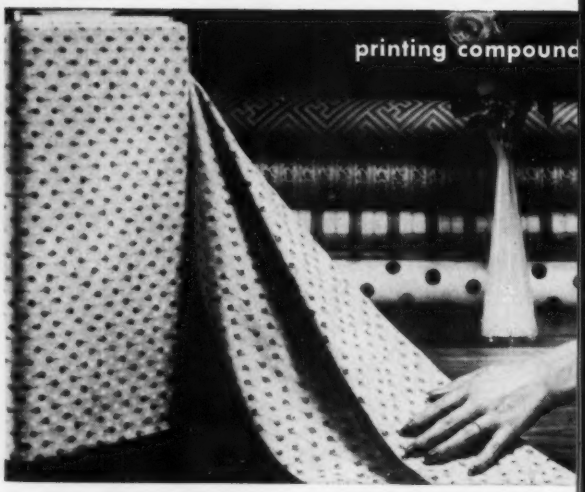

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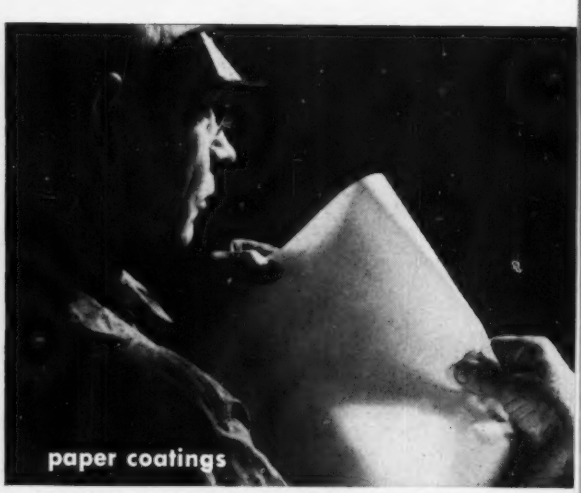

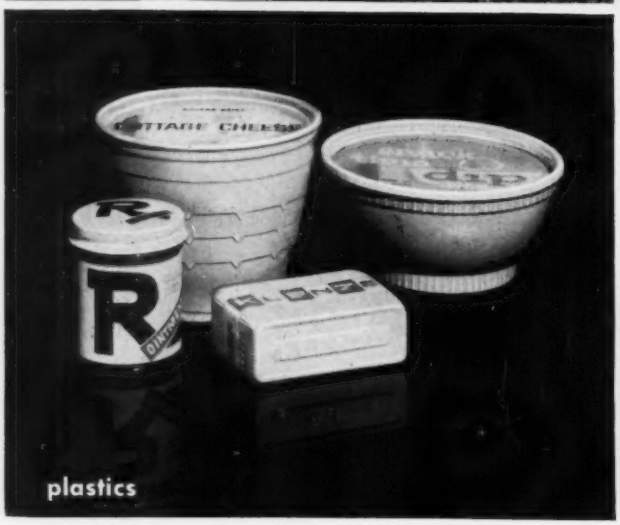

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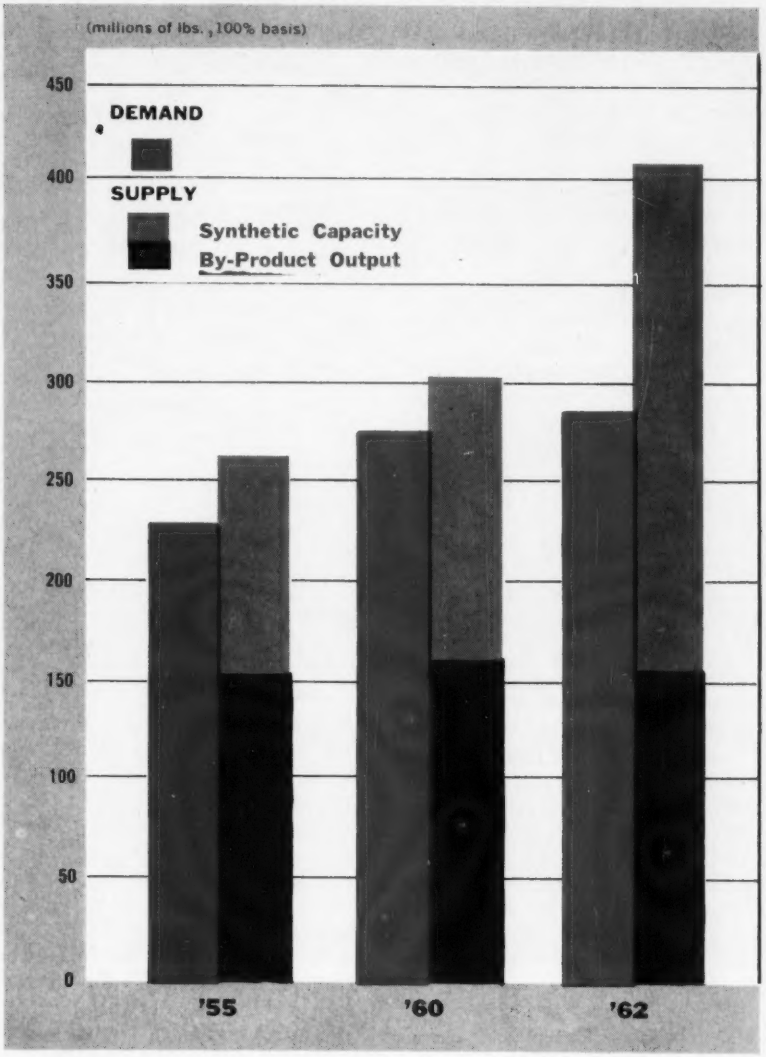

Glycerin Glut Ahead?

After enjoying years of booming business, glycerin producers are beginning to feel the pains of serious overcapacity, crumbling price structure and diminishing profits. And it may get worse—unless they firm their prices at current levels.

The supply-demand situation started to get out of balance back in first-quarter '61. At that time Shell Chemical finished a 35-million-lbs./year synthetic glycerin plant expansion at Houston, Tex. In the second quarter Atlas Chemical Industries started building a 35-million-lbs./year unit at Atlas Point, Del.; and earlier this month Olin Mathieson confirmed that its Organics Division will have a 40-million-lbs./year unit onstream at Brandenburg, Ky., by next April.

Although these three units alone add 110 million lbs./year of glycerin capacity, demand by mid-'62 is expected to register only a slight advance (less than 10 million lbs.).

For producers, the only bright spot in the entire supply-demand picture is the slightly diminishing availability of by-product glycerin, the other source of the material. But the decline is so slight it will be scarcely noticeable.

Oversupply Consequences: The exploding capacity buildup is developing into a major headache for producers: the glycerin price structure is crumbling almost as fast as new production units are built. For several years prices were firm. In fact during late '59 tabs advanced 1½ ¢/lb. But as soon as Shell's new plant shifted into final stages of completion, and as Atlas and Olin's plans began to gel, the price declined 2¢/lb. across the board. In May an additional 2¼ ¢ slash was initiated and still no firmness had developed. In August by-product glycerin producers began discount allowances to users.

Right now trade observers see a continuing softness in the market and expect further price cuts before mid-'62. The producers, on the other hand, disagree, see no softness, predict no price slashes in the near future. But in that event several producers will be hard pressed to market all their output.

The problem, moreover, is intensified by the important position of by-product glycerin in the entire market scene and the limitation of storage facilities.

Meanwhile, there is lack of any evidence of a fast pickup in demand. Worse, the export market is disintegrating as overseas production capacity builds up, and imported glycerin is starting to get a larger part of the domestic market. This year (through July) imports have totaled 11.2 million lbs., compared with 6.5 million in the first seven months of last year. At the same time, exports declined to 8.9 million lbs., compared with 13.4 million in '60.

Glycerin demand, including exports, advanced to about 278 million lbs. in '60—a 48-million-lbs. gain. But by '65 total demand will have inched up to only 295 million lbs./year, a 17-million-lbs. rise—unless some new, big uses come along fast, which isn't likely. Moreover, the major current applications are expected to register only modest gains during the next five years.

Alkyds Top Taker: Alkyd resin manufacture has been the major gly-

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cerin application and will remain important during the next several years. Glycerin has held on to a big share of the alkyds market despite competition from other polyhydric alcohols —e.g., pentaerythritol and ethylene glycol. But the alkyds themselves have been losing out in coatings to the newer resin systems—e.g., epoxies, latexes and acrylics. By '65 alkyds production will probably reach only about 175 million lbs./year—an 11-million-lbs. advance over '60's 164 million. Concomitantly, glycerin demand for this use will register a gain of only about 2-million lbs., reach the 67-million-lbs./year level.

Cellophane rates second as a glycerin consumer. Glycerin is used as a softener for cellophane sheet. And to improve the film's heat-sealing and dimensional-stability properties. Although other, less-costly glycols compete in this application (propylene, ethylene and polyethylene glycols), they are not expected to cut into glycerin's share of the market.

But cellophane is also feeling the competitive pressure of newer, improved products. The newcomers have been carving out a generous portion of the total film market, thus putting a damper on cellophane's growth curve. Result: cellophane will take only about 55 million lbs. of glycerin in '65 (vs. 49 million in '60).

The drug and cosmetic industries offer glycerin a somewhat healthier outlook. Their demand for the material will rise about 20% to 58 million lbs. in '65 (vs. 46 million lbs. in '60).

Glycerin's unique ability to "body" and lubricate, thicken and prevent hardening of toothpaste is a major stimulant to growth. Also, glycerin is an important ingredient in numerous pharmaceutical products—e.g., cough medicines, syrups, jellies and ointments. Gains being made by these products boosts glycerin sales.

Tobacco, food, beverages and explosives are the only other major glycerin takers. While tobacco, food and beverage production will advance glycerin only modestly during the short-term future, its use in explosives is declining.

Nitroglycerin is employed as a freezing-point depressant in explosive oils. Now it represents about 30% of the weight of the oil. Originally it was 75%. This formulation change, along with the invasion of ammonium nitrate-fuel oil explosives into the mining scene, are drying up this outlet for glycerin, may shrink it to about 15 million lbs./year by '65.

In addition, glycerin goes into a raft of miscellaneous applications, none of which currently displays encouraging growth prospects. In fact a decline in their glycerin requirements is likely. Reason: the inexpensive glycols—e.g., ethylene and propylene—are making substantial inroads into many of the small but collectively important end-uses.

Supply: Right now there are only two synthetic glycerin producers: Shell's 110-million-lbs./year unit at Houston (including the 35-million-lbs./year expansion) and Dow's 70-million-lbs./year plant at Freeport, Tex.

The Olin and Atlas plants under construction will bring total synthetic production capacity over the 250-million-lbs. mark before the end of next year.

In addition about 162 million lbs./year of glycerin are obtained as by-product from soap, fat-splitting and fatty alcohol production. Although fat-splitting and fatty alcohol output

Glycerin End-Uses

(all figures are estimates, in million pounds)

	'55	'60	'62	'65
Alkyd resins	61	65	65	67
Cellophane	38	49	53	55
Drugs and cosmetics	39	46	52	58
Tobacco	32	39	43	47
Foods and beverages	19	22	25	27
Explosives	18	16	16	15
Miscellaneous and exports	23	41	33	26
Totals	230	278	287	295

U.S. Synthetic Glycerin Capacity

(million pounds)

Shell Chemical, Houston, Tex.	110
Dow Chemical, Freeport, Tex.	70
Olin Mathieson,* Brandenburg, Ky.	40
Atlas Chemical Industries,* Atlas Point, Del.	35
Total	255

* Due to start operating mid-'62

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is rising, soap production is declining and is expected to continue downward during the short-term future. Consequently, glycerin by-product availability will diminish slightly to about 120 million lbs. in '65.

Outlook: In sum the glycerin situation resembles the dismal condition of so many other chemicals on the market—too much supply, not enough demand, crumbling price structure, diminishing profits—with not much chance of improvement.

Aluminum Supply Up

World aluminum production in '60 registered a 12.4% advance over '59, according to latest figures from the German Aluminum Assn.

Output was 3.6 million metric tons, a gain of 400,000 tons over '59's 3.2 million. But consumption remained steady at 3.2 million tons, boosting the total of world aluminum stocks 400,000 tons.

The U.S. produced 2.5 million tons; Europe, 0.86 million; Asia, 0.16 million; Africa and Australia, the remainder.

Western Germany paced the gainers. It produced 169,000 tons of primary aluminum, up 11.8% over '59, and secondary production was up 18.2%, to 134,000 tons. About 72% of the primary aluminum produced there is processed by the state-owned Vereinigte Aluminum-Werke in Bonn —the remaining 28% by the Aluminum Huette Rheinfelden, a wholly owned Swiss concern.

Vereinigte is building a 40,000-tons/year plant at Norf-by-Neuss, Ruhr. Estimated cost: $62.5 million. Onstream target: mid-'63.

Consumption of aluminum in the U.S. and Canada dropped 15.2% last year—to 1.68 million tons from 1.98 million tons in '59. Meanwhile, European fabricators used 24.5% more primary aluminum in '60 than they did in '59. Western Germany alone took 27% more primary and secondary aluminum.

It is estimated that the per-capita consumption of the metal in Germany is now 16.9 lbs. vs. 22.6 lbs. in the U.S., 21.3 lbs. in Switzerland, 19.5 lbs. in Great Britain. West German fabricators expect a sharp increase in use next year because automobile manufacturers will make more parts from the metal.

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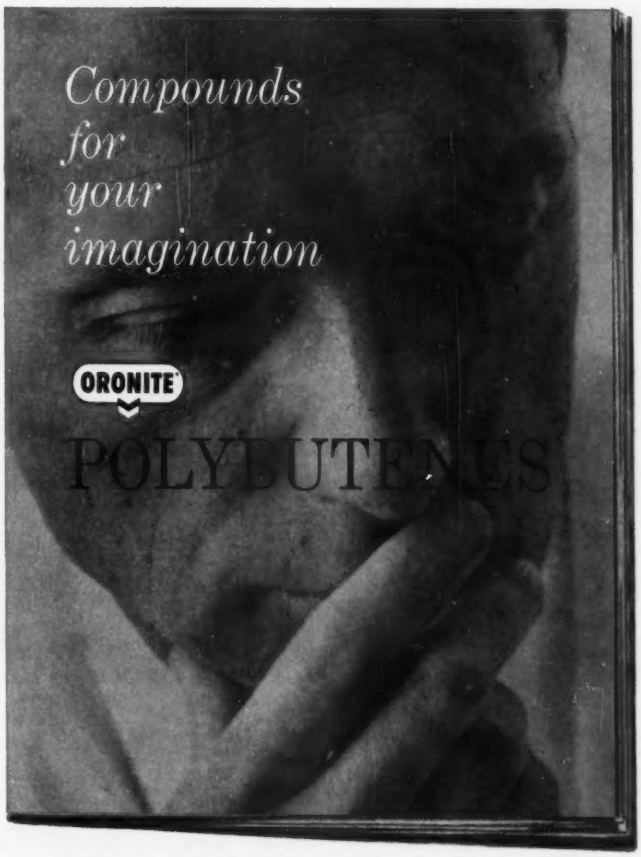

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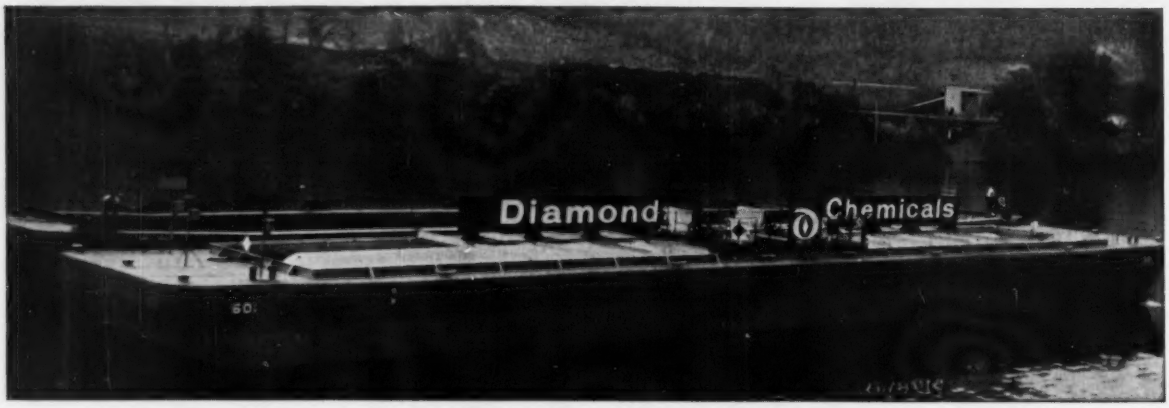

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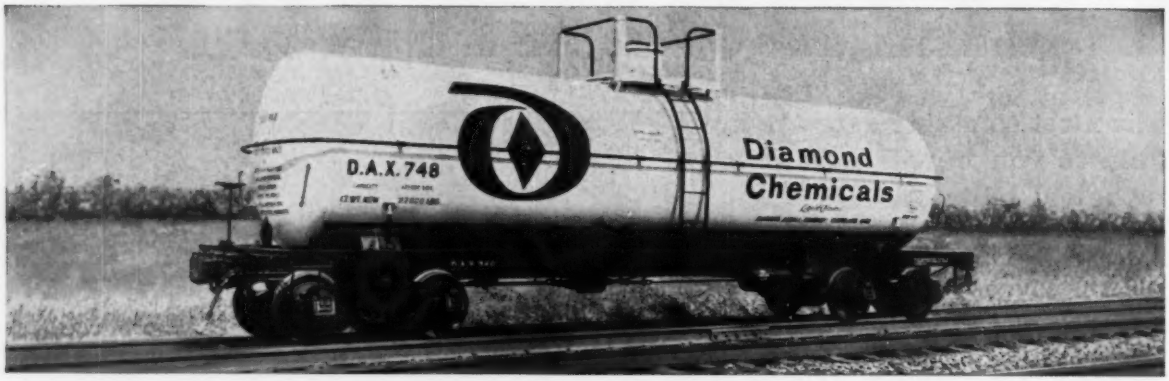

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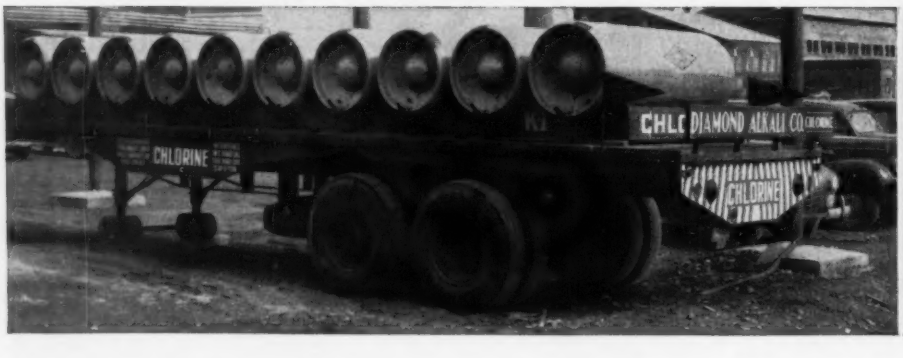

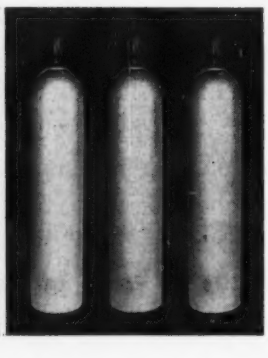

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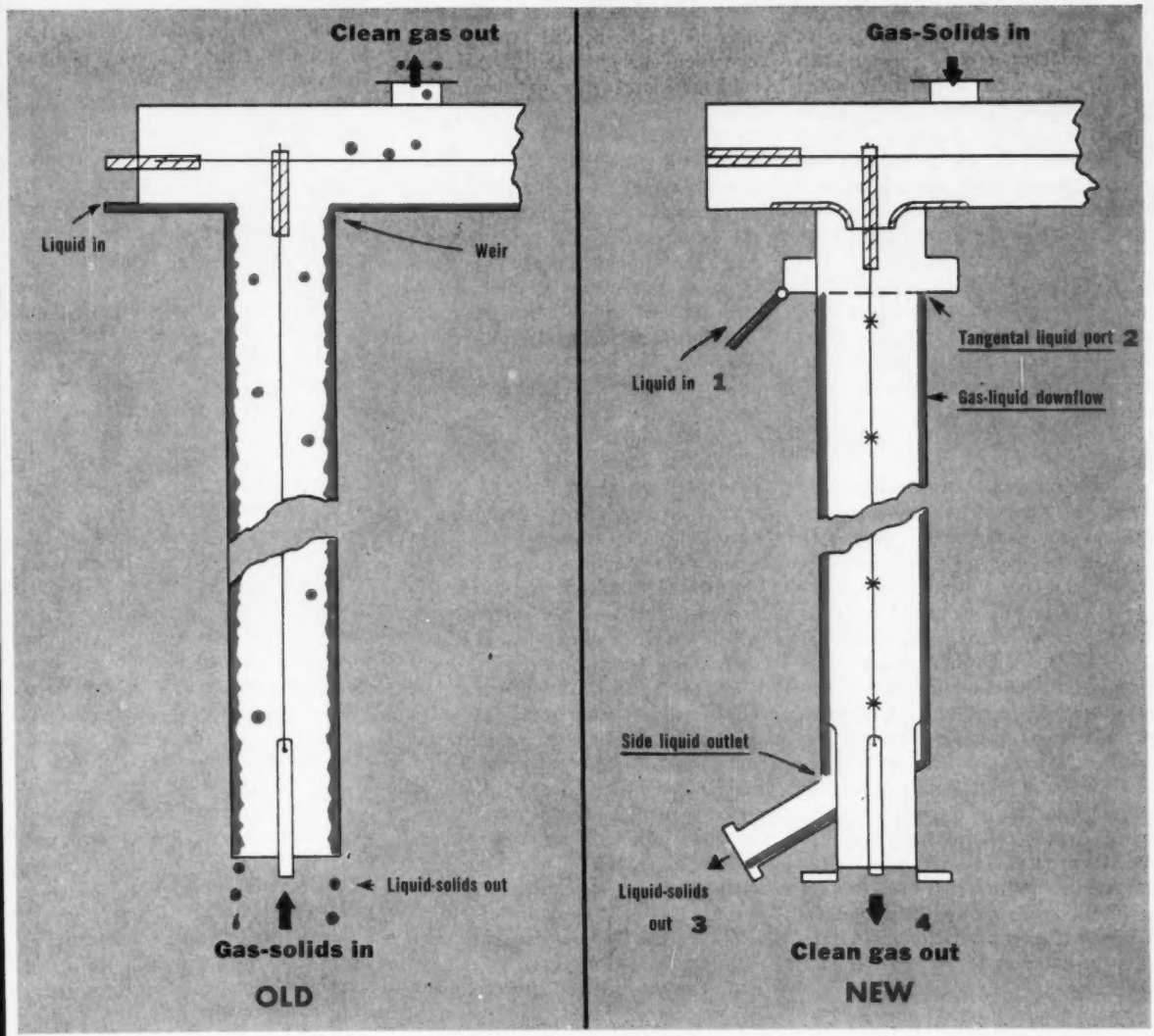
Four Points Mark Precipitator Improvement



1 New unit supplies liquid along with—instead of counter to—the gas stream flow.

2 Has pressurized feed instead of gravity feed, to insure continuous liquid film.

3 Has a side liquid outlet so that the liquid is diverted from entering gas.

4 May operate at high gas feed rates, yet avoid liquid pickup (colored dots) at exit.

Bolstering Gas Cleaner Efficiency

This week, Koppers Co. Inc. (Pittsburgh) is scaling up to prototype a new wet electrostatic precipitator. If the prototype lives up to advance notices, it could cut capital investment up to 20%, use 50% less water, and reach twice the throughput rate of conventional wet precipitators.

The new unit differs in three major ways from conventional wet electrostatic precipitators Koppers turns out, and from those made by Research Cottrell (Bound Brook, N. J.), and Western Precipitation Corp. (Los Angeles): it features co-current liquid-flow, a tangental liquid inlet and a special shielded liquid outlet. Since Koppers is chary about discussing full details on the new unit until a prototype can be evaluated, the information on the precipitator was sifted from Koppers' patent (U.S. No. 2,956,640).

The patent explains that conventional electrostatic precipitators were built around a counter-flow principle (gas traveling upward, liquid down-

ward) to simplify piping. In the usual pipe-type precipitator, an electrode mounted vertically inside the pipe ionizes particles in the upflowing gas stream, causing them to migrate to the oppositely charged pipe wall. Then the liquid (which is generally water but may be a process fluid—e.g., black liquor) washes the particles adhering to the pipe wall down and out the bottom. From here, the particles, if worth saving, can be removed from the waste liquid.

The big disadvantage with countercurrent flow is that the upflowing gas often creates a turbulence that causes the liquid to separate from the pipe walls and to become entrained with the gas. This in turn results in higher liquid usage and arcing with consequent loss in efficiency.

Greater Throughput: On the other hand, the Koppers unit, by using cocurrent flow, reportedly eliminates most of the opportunities for entrainment and arcing. Furthermore, the gas input rate may be increased from the normal 7½-ft./second gas velocity to a range of 20 to 60 ft./second (depending on the particle removal efficiency desired) and the power input may be upped from the relatively low level of 20 kv. (kilovolts) to an average of 50 kv. Net result: a smaller precipitator with an estimated 15-20% lower capital cost to handle equipment flow rates. In order to get high efficiencies, in the plus 98% range, with reasonable power consumption, however, the gas velocity input rate must be cut back to the lower end of the range.

The co-current flow alone, however, could not account for the Koppers unit's touted advantages. Also contributing to economical operation are a tangental liquid inlet and a special outlet. These help by maintaining a smooth liquid film inside the precipitator pipe at the high gas rates.

The tangental spray inlet injects the wash liquid under pressure into the pipe at several points. This arrangement should be less likely to interrupt the flow than the familiar weir overflow arrangement.

At the outlet, the liquid is not permitted to drip out the bottom of the tube directly into the path of the upflowing gas—it is caught and diverted into a shielded side exit. This reduces entrainment by preventing intimate gas-liquid contact.

Proof of the Pudding: The advantages claimed for the new precipitators have yet to be proved in large-scale operation—the crucial test. As a result, there are a few drawbacks that may appear on the prototype but haven't shown up in smaller test models.

For example, one precipitator expert pointed out the possibility that the liquid outlet may easily become plugged. All flow from the many precipitating pipes empties into a common header with a 90-degree turn. This turn is where solids are likely to build up. Another possible trouble spot: the nozzles. Replacement of plugged or worn nozzles could be expensive and time consuming.

Stand in Line: If the Koppers unit can overcome these potential objections, it could easily become a popular item for plant equipment purchasing agents. But Koppers isn't aiming at chemical users first. It intends initially to concentrate on steel mill applications—the cleaning up of open-hearth stack gases. There are over 900 open-hearth furnaces in the country, of which only 44 employ air pollution control (43 of these use electrostatic precipitators). Considering that the remaining number (over 850) are a potential market for electrostatic precipitators with total installed costs as high as $1½ million each, the steel application is a potentially big business.

But the rest of the chemical process industries have a big stake in electrostatic precipitators, and chemical management men should give the new Koppers unit a good hard look. The chemical industry itself accounts for an estimated 20% of all precipitators sold. They are used in many process applications—e.g., removal of acid mists in sulfuric acid processings; taking out dust particles or fly ash from chemical or power plant stacks; salvaging valuable sodium salts from the gases leaving black liquor recovery furnaces; and the recovery of particles from cement kilns. Koppers hopes to meet the needs of these potential customers.

Lower capital cost, less water and higher throughput are the goals waiting to be achieved. If successful, the new Koppers unit is headed for many chemical plant jobs.

EQUIPMENT

Mass Flowmeter Tester: General Electric's Instrument Dept. (Schenectady, N.Y.) has a new in-line test kit for field testing its industrial mass flowmeters. The kit, which contains weights, a lever and pulley, stopwatch, cord and data-record cards, can be used to calibrate mass flowmeters without removing them from the line. A plug at the top of the flowmeter housing is removed and the lever from the test kit is inserted into the turbine. Cord, attached to the lever, is threaded over the pulley and tied to a weight. The weight exerts a steady pull on the turbine, causes the flowmeter's gyro to precess. Rate of precession is measured with the stopwatch.

•

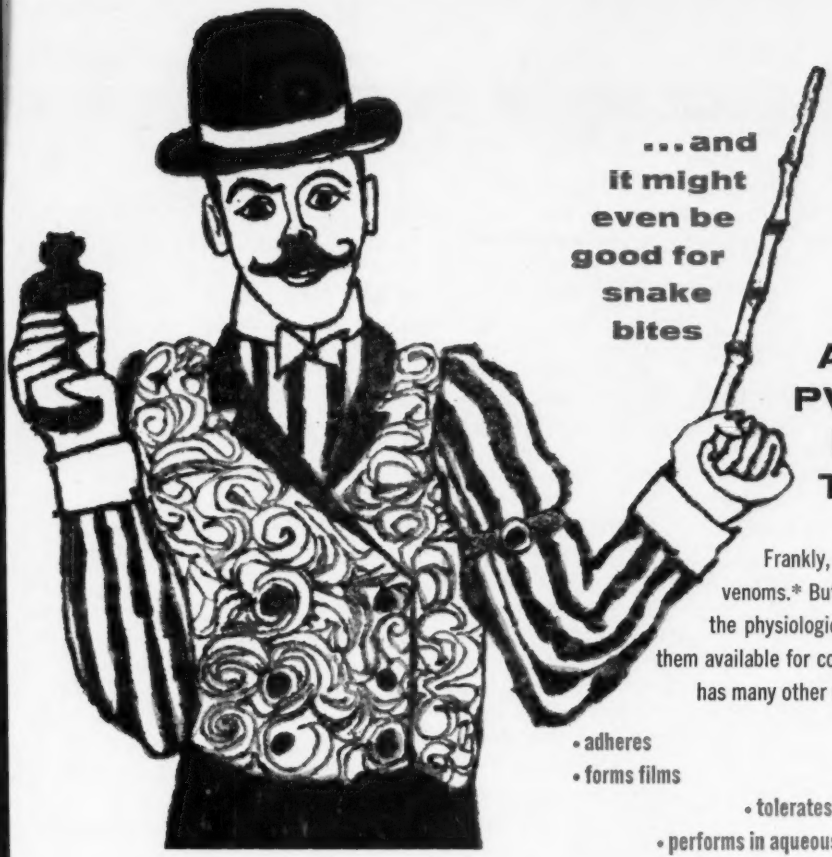
Ball Valve Actuator: Ramcon Corp. (Fairfield St., Worcester, Mass.) is offering a new line of electric ball-valve actuators that can be mounted on any type of ball valve. A special mounting bracket permits the actuators to be used with ½- to 3-in. valves. The actuators are built for 115 volts ac., have weatherproof or explosion-proof housings.

•

Pipe and Fittings: The Babcock & Wilcox Co. (161 East 42nd St., New York 17) has been licensed to produce and sell welding fittings and flanges of Yoloy steel to match Youngstown Sheet & Tube Co.'s alloy piping. Youngstown claims Yoloy, a high-strength, low-alloy steel, with 2% nickel and 1% copper, is lower in cost and has better corrosion resistance than has wrought iron.

•

Fluid Metering: Lapp Insulator Co.'s Process Equipment Division (LeRoy, N.Y.) has expanded its metering-pump line. The Microflo LS-30, for pumping in the 780 cc./hour flow range, now has a metal diaphragm that extends the temperature and pressure range to 212 F and 3,000 psig. The diaphragm of stainless steel also is part of a new reagent head that can be mounted directly onto the gear box of any Pulsafeeder Microflo metering pump. Previously, for metering aromatic and some halogenated products, remote construction was required. The unit has uses in chemical, textile and petroleum plants, pilot units and labs.



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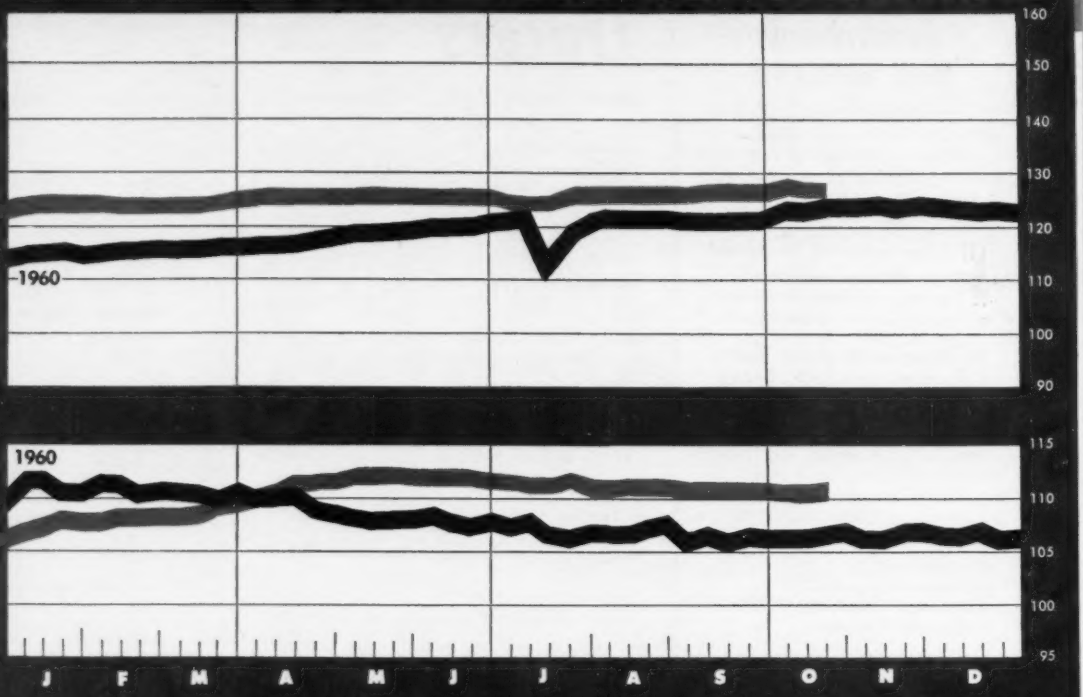
BUSINESS BENCHMARKS



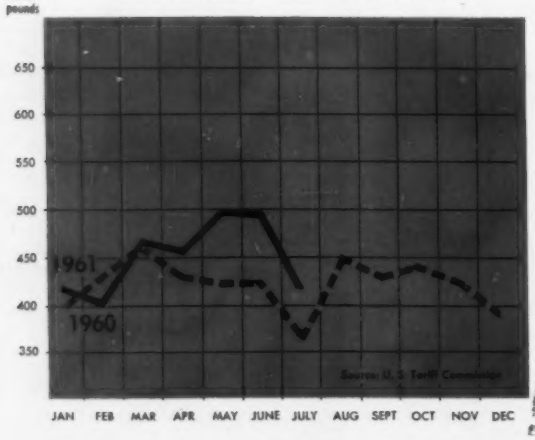
OCTOBER 21, 1961

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	125.9	125.9	124.9
Chemical Week wholesale price index (1947=100)	109.4	110.1	107.0
Stock price index (12 firms, Standard & Poor's)	53.76	53.59	45.05
Steel ingot output (thousand tons)	2,102	2,131	1,522
Electric power (million kilowatt-hours)	15,035	15,340	14,107
Crude oil and condensate (daily av., thousand bbls.)	7,112	7,156	6,803

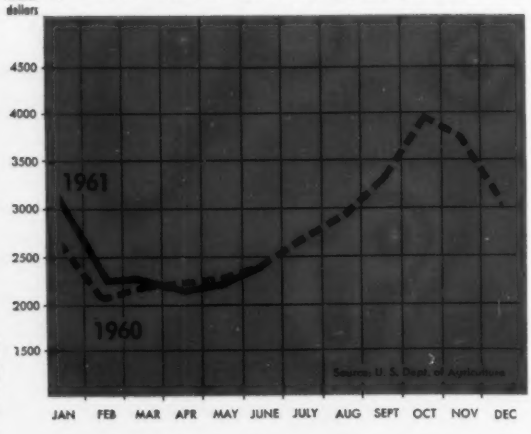
TRADE INDICATORS	MANUFACTURERS' SALES			MANUFACTURERS' INVENTORIES		
(billion dollars)	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
All Manufacturing	31.59	31.16	30.15	53.99	53.55	54.98
Chemicals and Allied Products	2.58	2.50	2.33	4.21	4.25	4.18
Petroleum and Coal Products	3.19	3.29	3.17	3.36	3.38	3.29
Paper and Allied Products	1.18	1.17	1.09	1.68	1.66	1.63
Textile Products	1.24	1.24	1.20	2.72	2.75	2.67

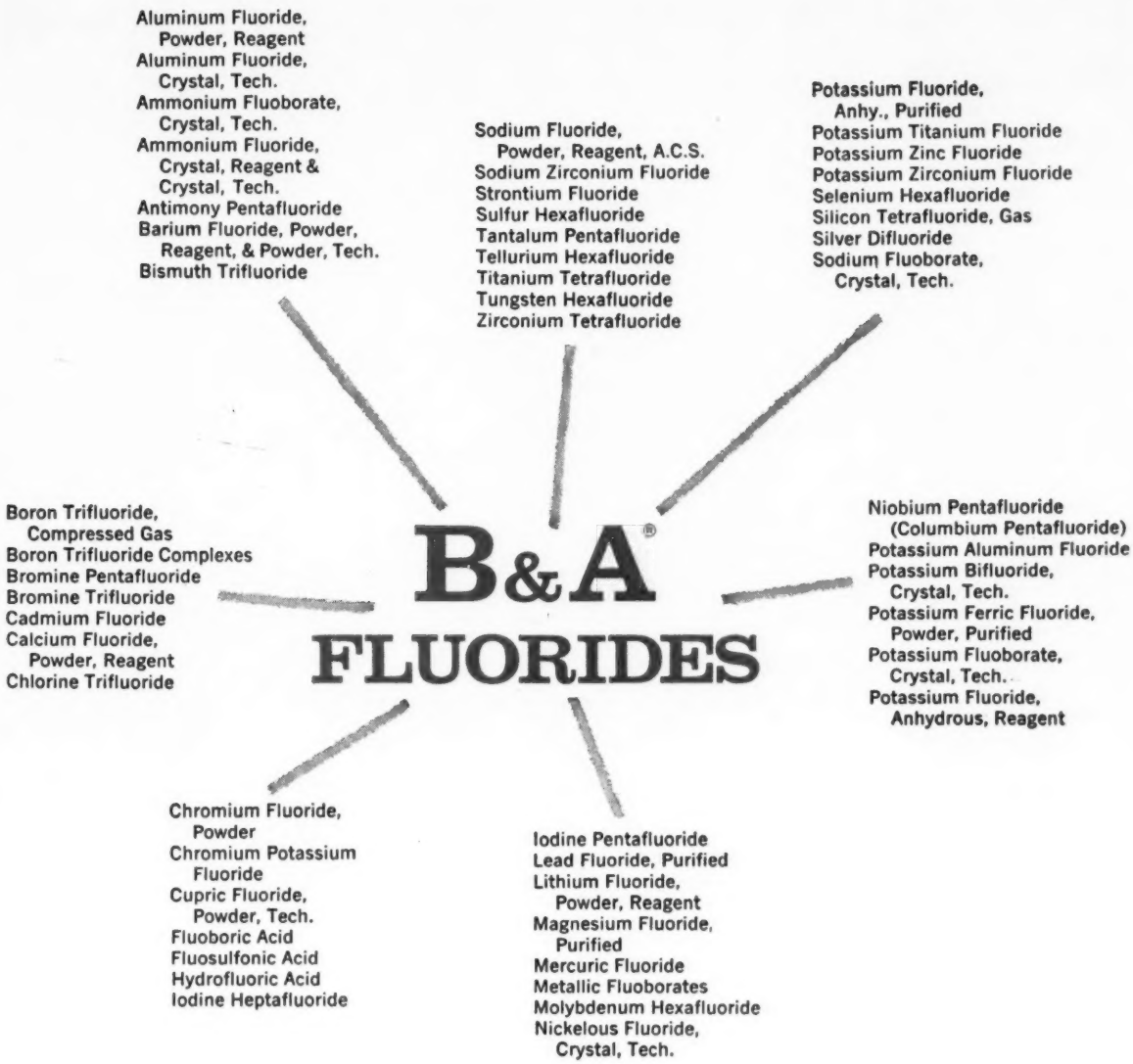
CHEMICAL CUSTOMERS CLOSE-UP

MANUFACTURERS' SALES OF PLASTICS



CASH RECEIPTS FROM FARM MARKETINGS





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FEBRUARY 1960	30
APRIL 1960	8
JUNE 1960	11
SEPTEMBER 1960	5
OCTOBER 1960	7
NOVEMBER 1960	24
DECEMBER 1960	21
JANUARY 1961	51
FEBRUARY 1961	60
APRIL 1961	10
MAY 1961	20
JUNE 1961	10
AUGUST 1961	20
TOTAL	287

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